



Relocation of the Power Substation at Grand Canyon Village, Grand Canyon National Park, Coconino County, Arizona

Environmental Assessment Assessment of Effect

September 2003

Note to Reviewers and Respondents

If you wish to comment on the environmental assessment, you may mail comments to the name and address below. Our practice is to make comments, including names and home addresses of respondents, available for public review during regular business hours. Individual respondents may request that we withhold their home address from the record, which we will honor to the extent allowable by law. There also may be circumstances in which we would withhold from the record a respondent's identity, as allowable by law. **If you wish us to withhold your name and/or address, you must state this prominently at the beginning of your comment.** We will make all submissions from organizations or businesses, and from individuals identifying themselves as representatives or officials of organizations or businesses, available for public inspection in their entirety.

Please Address Comments to:

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Summary

The NPS is proposing to relocate a power substation at Grand Canyon Village from an area intended for public use to an area identified as a transportation/utility corridor. The purpose of the proposed undertaking is to remove utility uses from public areas in order to provide a safer and more enjoyable visitor experience in the park. The existing substation is found next to the historic Powerhouse building. The objectives of relocating the power substation are to:

- Remove the substation from an area intended for visitor use to an area identified as a transportation/utility corridor;
- Provide a safer and more enjoyable visitor experience in the park;
- Provide an environment for visitors separate from utility facilities and equipment; and
- Improve the visual quality within the visitor core of Grand Canyon Village.

The General Management Plan (GMP) completed in 1995 directs the NPS, among other things, to develop visitor use management strategies that enhance the visitor experience while minimizing crowding, conflicts, and resource impacts (NPS 1995a). The GMP specifically states, “Visitor services on the South Rim will be concentrated in the historic village, the adjacent powerhouse area, and the business center. Functions now occurring in these areas not directly related to visitor services (for example, maintenance, storage, and employee housing) will be moved to areas where the visitor experience will not be affected. Instead of building new facilities, historic structures will be adaptively reused for visitor service functions.”

This Environmental Assessment/Assessment of Effect (EA/AEF) analyzes the impacts of three alternatives: A) No Action; B) Relocation of the substation with an underground distribution line; and D) Relocation of the substation with an overhead distribution line. Impacts to natural, cultural, and visitor experience are described in this document.

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Introduction

This environmental assessment and assessment of effect provides disclosure of the planning and decision-making process and potential environmental consequences of the alternatives for relocating a power substation and associated distribution lines on the South Rim of Grand Canyon National Park. This document also contains the information needed for consultation with the State Historic Preservation Office under Section 106 of the National Historic Preservation Act. The analysis of environmental consequences was based on a need to involve the public and other agencies in the decision-making process and to adequately analyze the consequences of the impacts related to the proposed action. In implementing this proposal, the National Park Service (NPS) would comply with all applicable laws and executive orders.

Purpose And Need

The NPS is proposing to relocate a power substation at Grand Canyon Village from an area intended for public use to an area identified as a transportation/utility corridor. The purpose of the proposed undertaking is to remove utility uses from public areas in order to provide a safer and more enjoyable visitor experience in the park. The existing substation is found next to the historic Powerhouse building (a National Historic Landmark) within the Grand Canyon Village National Historic Landmark District.

The General Management Plan (GMP) directs the NPS, among other things, to develop visitor use management strategies that enhance the visitor experience while minimizing crowding, conflicts, and resource impacts (NPS 1995a). The GMP specifically states, "Visitor services on the South Rim will be concentrated in the historic village, the adjacent powerhouse area, and the business center. Functions now occurring in these areas not directly related to visitor services (for example, maintenance, storage, and employee housing) will be moved to areas where the visitor experience will not be affected. Instead of building new facilities, historic structures will be adaptively reused for visitor service functions (*Ibid.*)."

Project Objectives

The objectives of the proposed action are to:

- Remove the substation from an area intended for visitor use to an area identified as a transportation/utility corridor;
- Provide a safer and more enjoyable visitor experience in the park;
- Provide an environment for visitors separate from utility facilities and equipment; and
- Improve the visual quality within the visitor core of Grand Canyon Village.

Project Location

Grand Canyon National Park – designated a World Heritage site, is one of the most popular tourist destinations in America. It is located in the southwestern United States on the Colorado Plateau in Coconino and Mohave counties, Arizona (Figure 1). The park is divided by the canyon into the North Rim and South Rim areas. This analysis is focused on the South Rim.

The existing substation is located next to the Powerhouse building in the Grand Canyon Village National Historic Landmark District. It was built in the mid-1950s in an area that encompasses approximately 75-square-feet and is enclosed with a chain-link security fence. Active elements of the substation include, a transformer that reduces the electrical voltage from 69 kV to 12.5 kV; a voltage regulator; and, two substation reclosures (similar to circuit breakers). The substation has an electrical capacity of 8 megawatts and provides 12.5 kV power to the South Rim area, including Desert View, Hermits Rest, Indian Gardens, and Phantom Ranch. This is accomplished through a combined network of overhead and underground distribution lines.

The area of analysis for the new substation is approximately ¼ mile southeast of Pinyon Park where the high voltage power line makes a 75-degree turn to the west as it approaches Grand Canyon Village. Access for the project would be along an existing right-of-way road that intersects Center Road, across from the Clinic Road turn-off. Power distribution lines would be routed east and west from the substation within an already disturbed corridor created by other utilities. A firebreak is also created to the south of the utility corridor, in which vegetation has been removed. The lines going east would be adjacent to the existing sewer line and two-track road to Center Road, and then follow Clinic Road and Havasupai Road to an existing switching cabinet. Lines routed to the west would follow the existing high voltage transmission line and two-track road to a point south of Pinyon Park, near where the high voltage line to Indian Garden branches off. At this point, the line would connect to the existing infrastructure.



Figure 1. Vicinity map

Issues And Impact Topics Included in this Document

This environmental analysis was prepared in accordance with the regulations of the Council on Environmental Quality (CEQ), the National Environmental Policy Act (40 CFR § 1500 *et seq.*) and in §516 of the U.S. Department of the Interior's Departmental Manual.

In August 2001, a public scoping letter about this project was sent to 353 individuals including federal and state agencies, special interest groups, American Indian tribes, and interested citizens. The letter described the proposed project and requested comments. Four letters were received by the NPS from interested agencies, groups and citizens. In addition to the scoping letter, an article appeared in the Arizona Daily Sun on August 2, 2001. A synopsis of public comment is provided in Chapter 5.

Issues were identified using the public comments received during scoping. Once issues were identified, they were used to help formulate the alternatives and mitigation measures. Impact topics were then selected for detailed analysis based on substantive issues; environmental statutes, regulations and executive orders; and NPS Management Policies (2001). Issues and impact topics analyzed in this document include geology/soils; vegetation; wildlife; threatened, endangered, and species of concern; historic properties; recreational experience; and visual quality. A summary of the impact topics and rationale for selection are described as follows.

Natural Resources

Geology/Soils

Ground disturbance would be associated with the proposed activities and would have the potential to impact soil resources; therefore, this topic will be analyzed in this document.

Biotic Communities

Vegetation

Proposed construction of a new substation and distribution lines, as well as removal of the existing substation and feeder line would involve disturbance of native vegetation. The potential also exists for introduction and/or spread of exotic vegetation and noxious weeds from ground disturbing activities. Therefore, this topic will be analyzed in this document.

Wildlife

Proposed construction of the substation and distribution lines could potentially disturb wildlife or disrupt developed wildlife corridors. Therefore, this topic will be analyzed in this document.

Threatened and Endangered Species/Special Status Species

Section 7 of the Endangered Species Act of 1973, as amended, requires all federal agencies to consult with the U.S. Fish and Wildlife Service (USFWS) to ensure that any action authorized, funded, or carried out by the agency does not jeopardize the continued existence of listed species or critical habitats. In a letter dated August 13, 2001, the USFWS listed 20 endangered, threatened, or candidate species that have the potential to occur in Coconino County. Research conducted by Park staff and others has indicated that three of these species, the Mexican spotted owl (*Strix occidentalis lucida*; threatened), the California condor (*Gymnogyps californianus*; experimental/nonessential), and the sentry milk-vetch (*Astragalus cremnophylax* var. *cremnophylla*; endangered) plus two additional species the Park manages for, the peregrine falcon (*Falco peregrinus*; delisted) and Northern goshawk

(*Accipiter gentiles*) may occur in the project vicinity and may be affected by either action alternative. Therefore, these species will be analyzed in this document.

Cultural Resources

The NPS is mandated to preserve and protect its cultural resources through the Organic Act of August 25, 1916, and through specific legislation such as the Antiquities Act of 1906, NEPA of 1969 (as amended), National Historic Preservation Act of 1966, NPS Management Policies, Cultural Resource Management Guideline (Director's Order-28), and the Advisory Council on Historic Preservation's implementing regulations regarding "Protection of Historic Properties" (36 CFR §800). Other relevant policy directives and legislation are detailed in Director's Order-28. The NPS has notified the State Historic Preservation Office (SHPO) that an EA/AEF would be prepared for this project in order to comply with § 106 NHPA consultation requirements.

Historic Properties

The removal of the substation and feeder line from Grand Canyon Village National Historic Landmark District could affect historic properties and the National Historic Landmark designation. Therefore, this topic will be analyzed in this document.

Visitor Experience

Recreational Resources

It is estimated that Grand Canyon Village receives more than four million visitors each year. Providing an enjoyable and safe experience for those visitors is very important to the NPS. The existing substation is located next to the Powerhouse building, in the Grand Canyon Village National Historic Landmark District. Although not currently used by visitors, they can easily walk by the existing substation on their way to the mule barn and can view the substation from visitor facilities, such as the Bright Angel Hotel. Therefore, this topic will be analyzed in this document.

Visual Quality

Vulnerability to visual impacts is a function of a site's visibility, the size of the development, and the site's capacity to absorb change. The proposed project may alter the visual condition of the area surrounding the existing substation, as well as the area proposed for the new substation and distribution line. Installation of the line – whether underground or placed on overhead poles, also could affect visual quality. Therefore, this topic will be analyzed in this document.

Impact Topics Eliminated from Further Consideration

Water Quality

The NPS seeks to restore, maintain, and enhance the quality of all surface and ground waters in the park, consistent with the Federal Water Pollution Control Act, as amended, and other applicable federal, state, and local laws and regulations. The quality of ground and surface water would not be measurably affected by the proposed relocation of the substation at Grand Canyon Village. By implementing best management practices, increased sedimentation from increased surface runoff and soil erosion would be minimal, and the potential to pollute local water sources would be unlikely. The proposed relocation of the substation would not need additional domestic water supply. Therefore, this topic will not be further addressed in this document.

Environmental Justice

In general, the term “environmental justice” refers to fair treatment of all races, cultures, and income levels with respect to laws, policies, and government actions. In February 1994, Executive Order 12898, titled Federal Actions to Address Environmental Justice in Minority Populations and Low-income Populations, was released to federal agencies. This order requires each federal agency to incorporate environmental justice as part of its mission. Federal agencies are specifically ordered to identify and address disproportionately high and adverse effects of its programs, policies, and activities on minority and low-income populations. In a related memorandum to heads of all federal departments and agencies, released concurrently with Executive Order 12898, the President underscores provisions of existing laws that are intended to help ensure the environmental quality of communities throughout the nation. This memorandum further states that mitigation measures identified in environmental documents should address significant and adverse environmental effects on minority communities and low-income communities.

None of the alternatives would have disproportionate health or environmental effects on minorities or low-income populations or communities as defined in the Environmental Protection Agency’s Environmental Justice Guidance, drafted in July 1996, as well as Executive Order 12898. This topic will not be analyzed in this document.

Archaeological Resources

Several archaeological investigations have been completed within the area of potential effect, including a 432-acre survey in 1997 for the Transit Corridor Project. The area proposed for the substation and distribution line falls entirely within the survey boundaries completed for the Transit Corridor Project. The survey was conducted systematically in 500-meter blocks, at transects spaced 15 meters apart, spanning 100 meters on either side of the proposed transit route/utility corridor (Moffitt 1998). Of the 46 archaeological sites that were identified as eligible for inclusion on the National Register of Historic Places during the survey, six are located along the corridor that is being considered for the power distribution line. Data recovery has been completed on all the sites according to mitigation requirements and procedures approved by the SHPO for the Light Rail Corridor Project Mitigation Plan (Moffitt and Moffitt 1998). No remaining archaeological sites would be affected by removing the substation and feeder lines from their existing location or building the new substation and distribution line. Therefore, this topic will not be analyzed in this document.

Ethnographic Resources

The lands of Grand Canyon National Park are traditionally affiliated with several tribes of the southwest – the Havasupai, Hopi, Hualapai, Kaibab Band of Paiute Indians, Navajo Nation, Paiute Indian Tribe of Utah, White Mountain Apache, San Juan Southern Paiute, and Zuni Tribes. Letters were sent to the tribes during the public scoping process. The Hopi and Navajo Tribes responded back in writing that they would like to review the environmental compliance documents associated with this project, but no Traditional Cultural Properties were identified in their letters. The Navajo Nation also requested that three local chapters (Tuba City, Cameron, and Leupp) be allowed to comment on the EA/AEF, as they may have additional information on local communities’ and traditional family’s cultural properties. No ethnographic resources (e.g., plant gathering areas or ceremonial sites) are known to occur in either the project area or its general vicinity. If ethnographic resources are identified during tribal review, consultation with appropriate tribal representatives would be conducted and mitigation measures developed. Therefore, this topic will not be analyzed in this document.

Air Quality

Project construction would result in an increase in fugitive dust from soil exposure and disturbance. However, this effect would only occur during the construction period and would be localized and negligible. Water or dust control agents would be applied during construction, if necessary, to control dust. Additionally, piles of excavated material from construction will remain under 4-feet-high to control dust.

The proposed activities would increase vehicle emissions from operating construction vehicles and hauling materials. However, the increased emissions would be localized and would have an immeasurable effect on regional or local pollutant levels. In addition, construction equipment will not be allowed to idle for more than 5 minutes. Therefore, this topic will not be analyzed in this document.

Floodplains

Executive Order 11988 (“Floodplain Management”) requires an examination of impacts to floodplains. The 2001 NPS Management Guidelines, DO-12, and the 1995 GMP provide guidelines on developments proposed in floodplains. Executive Order 11988 requires all federal agencies to avoid construction within the 100-year floodplain unless no other practical alternative exists. Certain construction within a 100-year floodplain requires that a Statement of Findings be prepared and accompany a Finding of No Significant Impact. The proposed locations for the substation and distribution line are not within the 100-year floodplain; therefore, none of the alternatives would be constructed within the 100-year floodplain. Consequently, no Statement of Findings for floodplains will be prepared and this issue will not be analyzed in this document.

Wetlands

Executive Order 11990, Protection of Wetlands, requires federal agencies to avoid, where possible, impacts on wetlands. Proposed actions that have the potential to adversely impact wetlands must be addressed in a Statement of Findings. Soils, hydrology, and vegetation typical of a wetland environment classify jurisdictional wetlands. No jurisdictional wetlands exist at or near the project area. Therefore, this topic will not be analyzed in this document.

Prime and Unique Farmland

All federal agencies are required to analyze the effects of their actions on soils classified as prime or unique by the Natural Resource Conservation Service (NRCS), as required by the Council of Environmental Quality in a memorandum of August 1980. The Farmland Protection Policy Act of 1981, as amended, also requires federal agencies to consider adverse effects to prime and unique farmlands that would result in conversion of prime and unique farmland to non-agricultural uses. Prime farmland is defined as soil that particularly produces general crops as common foods, forage, fiber, and oil seed; unique farmland produces specialty crops such as fruits, vegetables and nuts. The soils in the project area are shallow and poorly developed. According to the NRCS, there are no prime or unique farmlands associated with the project area (Email to Cole Crocker-Bedford, GCNP, from Phil Camp, NRCS, November 2002). Therefore, this topic will not be analyzed in this document.

Socioeconomic Values

The local economy and most businesses of the communities surrounding the park are based on construction, recreation, transportation, tourist sales, services, and educational research; the regional economy is strongly influenced by tourist activity. There may be short-term, negligible benefits to the local and regional economy resulting from construction-related expenditures and employment. Park businesses would not suffer any appreciable adverse short or long-term economic impacts from any of

the alternatives because electrical use would not be interrupted during construction of the new substation or removal of the old substation, and no businesses would be closed for construction purposes. None of the proposed alternatives would change local or regional land use. The short and long-term socioeconomic impacts of implementing any of the action alternatives would be consistent with the impacts described in the GMP EIS. Therefore, this topic will not be analyzed in this document.

Soundscape

The NPS is mandated by DO-47 (Sound Preservation and Noise Management) to articulate their operational policies that will require, to the fullest extent practicable, the protection, maintenance, or restoration of the natural soundscape resource in a condition unimpaired by inappropriate or excessive noise sources. Natural sounds are intrinsic elements of the environment that are often associated with parks and park purposes. They are inherent components of “the scenery and the natural and historic objects and the wildlife” protected by the Organic Act. Natural sounds may provide valuable indicators of the health of various ecosystems. Intrusive sounds are of concern because they sometimes impede the ability of the NPS to accomplish their mission.

Noise impacts from this project would only last during construction. After construction is completed, noise level impacts would essentially return to their natural condition. All construction would occur during daylight hours, when roads and the associated traffic already impact the area. Therefore, this topic will not be analyzed in this document.

Park Operations

The proposed substation and distribution lines would be operated and managed by the Arizona Public Service (APS). Park staff may monitor construction of the new substation and removal of the old substation, but it would not require additional staff. Construction monitoring is a short-term work assignment that is scheduled for all park projects through construction management, and would not create additional work on existing personnel. Park operations, therefore, will be not be affected by the alternatives, and will not be analyzed in this document.

Lightscape

The 2001 Management Policies guide the NPS in cooperating with park neighbors and local agencies to minimize the intrusion of artificial light into the night scene. Elements such as the stars, planets, and earth’s moon that are visible during clear nights influence many species, including humans. In natural areas, artificial outdoor lighting is limited to basic safety requirements and is shielded when possible. Construction and operation of the substation would conform to all standards required by the NPS to maintain the existing dark sky. Although the substation would require lighting for safety reasons, it would be shielded and directed towards the ground. It would not affect the ambient night sky outside the substation area. Therefore, lightscape will not be analyzed in this document.

Introduction

This section describes two alternatives for this project, in addition to the NEPA required “no action” alternative. In developing alternatives for this project, an alternative location of the substation was considered and subsequently dismissed. A description of the alternative considered and eliminated and the reason for its elimination is presented in this section.

Alternative A – No Action

Under the No Action Alternative, the NPS would not relocate the substation that is currently located next to the Powerhouse building in the Grand Canyon Village National Historic Landmark District, nor would they upgrade/expand the distribution system. Existing structures and hardware that are over 50-years old would be repaired and/or replaced as needed during regular maintenance operations and in response to emergency outages on the transmission lines and at the substation. These repairs would be expected to be made with increasing frequency in the future as the facilities increase in age.

Alternative B – Substation with An Underground Distribution Line

This alternative would involve the construction of a new power substation south of Grand Canyon Village, as well as an underground distribution line from the new substation to connect with the existing electrical infrastructure. The substation would be contained within a fenced enclosure with dimensions not to exceed 225 feet by 225 feet. This area would accommodate the fixed equipment needed for the substation and allow vehicles to maneuver safely around it. Its location would be approximately ¼ mile southeast of Pinyon Park where the high voltage power line makes a 75-degree turn to the west as it approaches Grand Canyon Village. Access for the substation and distribution line would be from Center Road, across from the Clinic Road turn-off, along an existing utility access road.

Outdoor lighting at the substation would conform to the lighting restrictions in the park. For example, overhead, outdoor lighting would be directed down and shielded from the sides. Brighter lighting may be required for use in emergency situations requiring nighttime work at the substation, but would only be used on an occasional basis and temporarily.

In addition to building a new substation, an underground power distribution line would be routed east and west from the new substation on the south side of existing sewer and power lines. The proposed alignment would remain within the corridor that has already been disturbed from other utilities. Construction of the distribution line would require an area approximately 30-feet-wide. All construction activities would remain within the already disturbed area. The line going east would follow the existing sewer line and two-track road to Center Road, and then follow Clinic Road and Havasupai Road to an existing switching cabinet. The length of the distribution line to the east is approximately one mile. The line routed to the west would follow the existing high voltage transmission line and two-track road to a point south of Pinyon Park, near where the high voltage line to Indian Garden branches off. At this point, the electrical line would be placed on the existing

overhead pole to connect with the existing infrastructure. The length of the distribution line to the west is approximately ½ mile. Figures 2 and 3 depict the location for the proposed substation and distribution line.

This alternative would also involve removal of the existing substation, as well as the primary line (69 kV) feeding it. The existing overhead secondary lines (480 volts) adjacent to the substation that are part of the Park's overall electrical distribution system would remain intact and in service for the purposes of this project. Figure 2 identifies the existing location of the substation and shows the proposed new location of the substation and underground distribution line.

In general, construction vehicles and equipment should be able to move overland without substantial improvements to the road or terrain. No new access roads would be built for this project. Access for construction vehicles and equipment would occur along existing roads and rights-of-way, specifically the existing right-of-way road across from Clinic Road along Center Road.

Arizona Public Service would perform all work and remove all demolished materials from the park.

Construction

The construction of the substation and distribution line would be completed within two years with the majority of construction activities occurring between May and October. During this period, the construction work force would peak at approximately 16 people on-site at any one time.

Storage and Staging Area

The area proposed for the new substation would be used as a staging area during construction. The new substation area would also serve as a reporting location for workers and parking space for vehicles during construction. Materials would be hauled to the new substation area using existing access roads and streets. As proposed, the entire area needed for the substation would be cleared and graded. Approximately one half the site would be used for storage of construction materials and equipment, while the other half was under construction and visa versa. Once the substation was built, sufficient storage area would be available to serve as a staging area for construction of the distribution line. The substation would not be staffed on a daily basis, but instead would require occasional visits to the substation to maintain the equipment and system.

Substation and Line Removal

The existing substation located next to the historic Powerhouse building would be disassembled after the new substation and distribution line were in service. All material associated with the substation would be removed from the site, and it would be graded and left in a condition ready for development of the Heritage Education Campus. In addition, the portion of the 69kV line that spans from the substation to the first pole outside the substation would be removed. All poles and other electrical lines would remain intact and in service. The conductor removed from the substation and overhead span would be salvaged or sold by the contractor, and much of the hardware would be recycled. Materials that cannot be recycled would be disposed at approved landfills.

Cleanup and Restoration

Waste material and rubbish from all construction areas would be collected, hauled away, and disposed of at approved sites. Upon completion of construction, all remaining disturbed areas would be reclaimed and revegetated as necessary to minimize erosion. The intent would be to restore all construction areas, as nearly as feasible, to their original condition. As previously described, once the existing substation is dismantled, the site would be graded and left in a condition ready for development of the Heritage Education Campus.

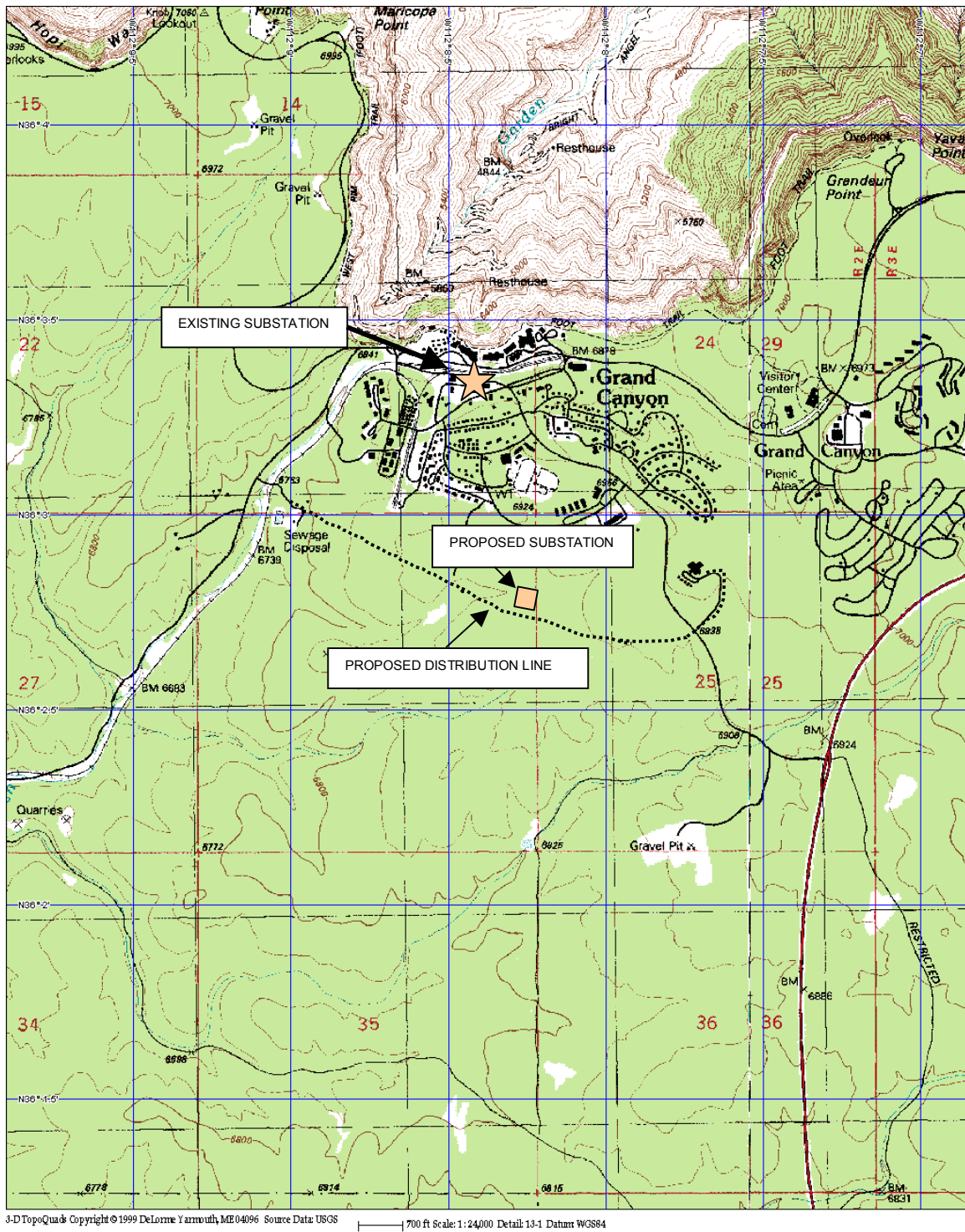
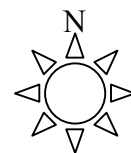


Figure 2. Project Area Map

Source: USGS 7.5' Quadrangle
 Grand Canyon, AZ



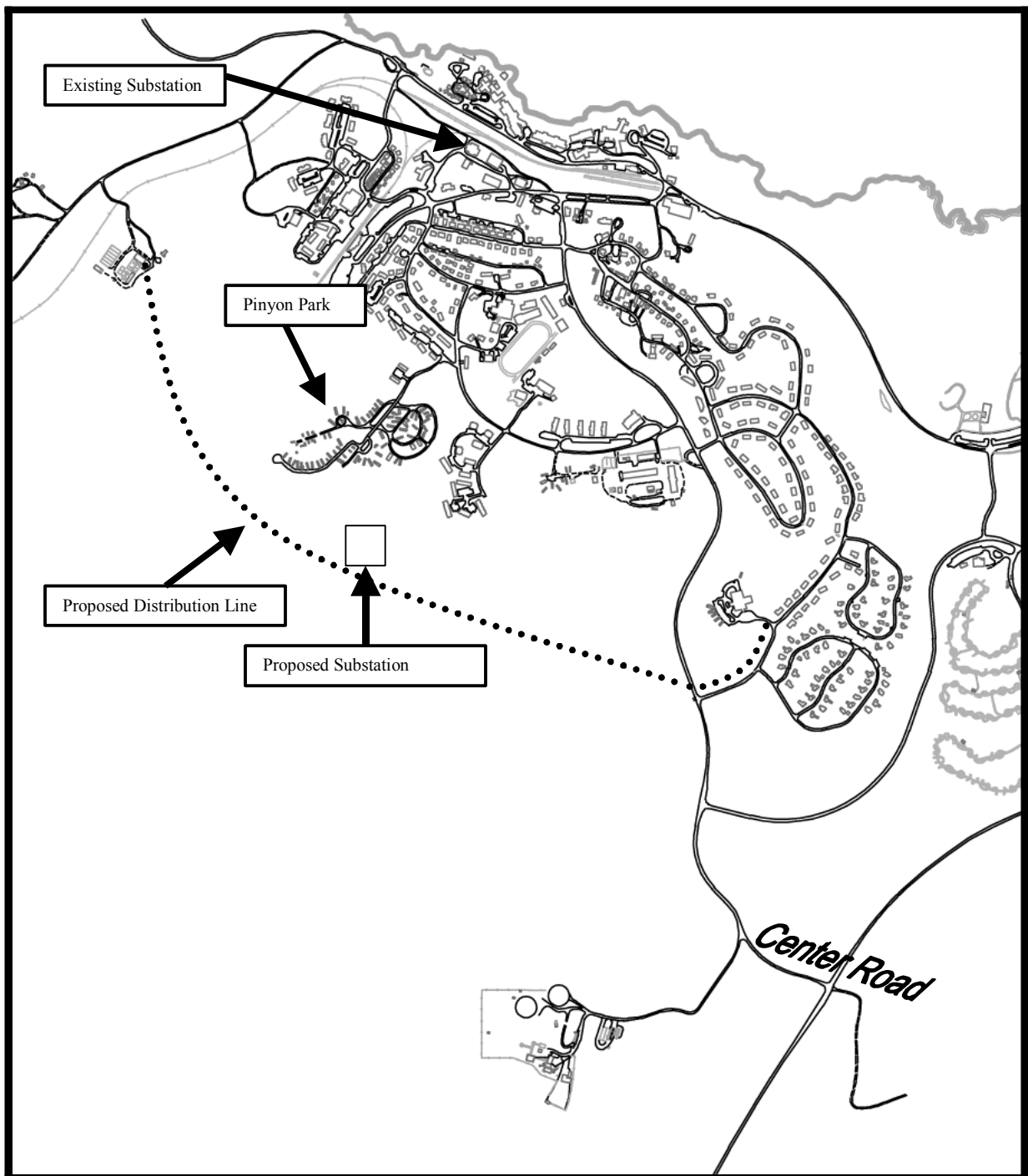
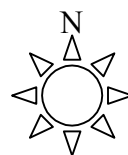


Figure 3. Proposed Distribution Line and Substation

Source: USGS 7.5' Quadrangle
Grand Canyon, AZ



Operation and Maintenance

The day-to-day operation of the substation and distribution line would be handled by APS, who would control the system with dispatchers in power control centers. These dispatchers use communication facilities to operate circuit breakers that control the transfer of power through the lines. These circuit breakers also operate automatically to ensure safety, for example, in the event of a structure or conductor failure.

Once in the ground, the distribution line would be virtually maintenance free and would not require routine patrols by APS. In the unlikely event that repairs were necessary, the damaged section would be identified, dug up, and replaced.

Alternative C – Substation with Overhead Distribution Lines

This alternative is nearly identical to Alternative B, but differs in the type of distribution line that would be installed. Instead of an underground distribution line, this alternative proposes an overhead distribution line within the same corridor described in Alternative B. The construction and location of the substation would be identical to that described in Alternative B.

The overhead power distribution line would be routed east and west from the substation as described in Alternative B. New poles would be placed approximately every 300 feet for the line going east from the substation, and would stand approximately 40-60 feet above ground. This would require approximately 15 new poles. Disturbance around each pole would be limited to a 50-foot diameter area. The distribution line going west out of the substation would be hung with the existing high voltage line. The pole structures themselves (a total of seven) are over 50 years old and would be replaced with new wood poles.

Poles would be placed within approximately 100 feet of Center Road on either side, and the electrical lines would span across Center Road at its juncture with Clinic Road.

As proposed in Alternative B, APS would perform all work and remove all demolished materials from the park.

Construction

Construction scheduling would be the same as described in Alternative B.

Storage and Staging Area

The storage of equipment and materials and staging area would be the same as described in Alternative B.

Substation and Line Removal

Substation and line removal would be the same as described in Alternative B, but would also include the replacement of seven poles along the distribution line west of the proposed substation.

Cleanup and Restoration

Cleanup and restoration would be the same as described under Alternative B.

Operation and Maintenance

Operation and maintenance would be similar to Alternative B; however, APS would provide routine maintenance for the overhead lines. APS' preventative maintenance program for transmission lines would include routine (usually once per year) ground patrols that drive the right-of-way in pick-up trucks to detect equipment needing repair or replacement (i.e., structures, insulators, and conductors). Maintenance may include repairing damaged conductors, inspecting and repairing structures, and replacing damaged and broken insulators. Transmission lines are sometimes damaged by storms, floods, vandalism, or accidents and require immediate repair. Emergency repair would involve prompt movement of crews to repair the damage and replace any equipment.

Mitigation Measures for the Action Alternatives

Mitigation measures are analyzed as part of Alternatives B and C. These measures have been developed to lessen the potential adverse effects of constructing the substation and distribution line.

Natural Resources

Geology/Soils

- To minimize soil erosion at the project site, standard erosion control measures including silt fence and sandbags will be used. Any revegetation will use site-adapted native species and/or seed.
- Construction zones will be fenced with construction tape, snow fencing, or some similar material before any construction activity begins. The fencing would define the construction zone and confine activity to the minimum area required for construction. All protection measures will be clearly stated in the construction specifications and workers will be instructed to avoid conducting activities beyond the construction zone as defined by the construction zone fencing.

Biotic Communities

Vegetation

To prevent and minimize the spread of exotic vegetation and noxious weeds, the following mitigation measures would be implemented:

- Existing populations of exotic vegetation at the construction site will be treated prior to construction activities.
- All construction equipment that leaves the paved road will be pressure washed prior to entering the park.
- Parking of vehicles will be limited to the substation and existing roads.
- Any fill material will be obtained from a park-approved source.
- After construction is complete, all remaining disturbed areas within the project site, excluding the existing substation site, will be revegetated as necessary, using site-adapted native seed and plants.
- Native plants will be salvaged from the project site and used to revegetate the site after construction activities have been completed. Plants will also be propagated according to NPS policy, from seed collected on adjoining areas to protect local genotypes.

- Post project exotic plant monitoring will be conducted in the project area as time and funding allows.

Wildlife

- All construction equipment and materials that are brought on site will be inspected for exotic pests. Any exotic pests that are found will be removed prior to equipment or materials entering the park.
- Construction workers and supervisors will be advised to keep their work site clean of debris, especially food wrappers and waste that may attract wildlife. Workers and supervisors will also be instructed to not feed the wildlife.

Threatened and Endangered / Special Status Species

- Construction workers and supervisors will be informed about special status species that are known to occur in the project area. If previously unknown special status species are discovered during construction, all work in the immediate vicinity of the discovery will be halted until Park staff re-evaluates the project and the work modified to allow for any protection measures determined necessary to protect the special status species.
- If a condor enters the construction site, construction will cease until it leaves on its own or until techniques are employed by permitted Park staff or Peregrine Fund personnel that results in the individual condor(s) leaving the area.
- Construction workers will be informed to refrain from interacting with condors and to immediately contact the appropriate Park or Peregrine Fund personnel when condor(s) are seen at the construction site.
- The construction site will be cleaned up at the end of each work day (i.e. trash disposed of, scrap material picked up) to minimize the likelihood of condors visiting the construction site.
- To prevent water contamination and potential poisoning of California condors or other wildlife, a vehicle fuel leakage and spill plan will be developed and implemented. The plan will include immediate clean up of any hazardous substance. The plan will define how each hazardous substance will be treated in case of leakage or spill.

Cultural Resources

To minimize impacts to cultural resources, the following mitigation measures will be implemented:

- If previously unknown archeological resources are discovered during construction, all work within a 100-foot radius of the discovery will be halted until the resources are identified and documented by a qualified archaeologist from the NPS, and an appropriate mitigation strategy developed, if necessary, in accordance with the stipulations of the 1995 *Programmatic Agreement Among the National Park Service, the Arizona State Historic Preservation Office, and the Advisory Council on Historic Preservation Regarding the General Management Plan/Environmental Impact Statement, Grand Canyon National Park, Arizona*.
- All workers will be informed of the penalties for illegally collecting artifacts or intentionally damaging any archeological or historic property. Workers will also be informed of the correct procedures if previously unknown resources are uncovered during construction activities.

- Should unknown buried deposits be located, data recovery excavations will be undertaken. These subsurface survey and data recovery efforts would be guided by a project-specific research design. Additionally, the NPS would begin consultations under the Native American Graves Protection and Repatriation Act in the event that buried human remains are discovered during archeological excavations or project development.

Alternatives Considered But Eliminated

In developing the alternatives, a different substation site was considered but eventually rejected. Brief description of this alternative and the reason for its elimination is provided below.

Alternative 1 – Alternative Substation Site

A second substation site farther south along the high voltage transmission line near the helibase was considered but rejected because access for large trucks would not be possible without substantially altering the existing two-track roads that would be used for access.

Environmentally Preferred Alternative

The environmentally preferred alternative is determined by applying the criteria suggested in the National Environmental Policy Act of 1969 (NEPA), which is guided by the CEQ. The CEQ provides direction that "[t]he environmentally preferable alternative is the alternative that will promote the national environmental policy as expressed in NEPA's § 101:

- fulfill the responsibilities of each generation as trustee of the environment for succeeding generations;
- assure for all generations safe, healthful, productive, and aesthetically and culturally pleasing surroundings;
- attain the widest range of beneficial uses of the environment without degradation, risk of health or safety, or other undesirable and unintended consequences;
- preserve important historic, cultural and natural aspects of our national heritage and maintain, wherever possible, an environment that supports diversity and variety of individual choice;
- achieve a balance between population and resource use that will permit high standards of living and a wide sharing of life's amenities; and
- enhance the quality of renewable resources and approach the maximum attainable recycling of depletable resources.

Alternative B is the environmentally preferred alternative. Alternative B was designed to use existing utility/transportation corridors and disturbed areas where possible, and to avoid major or adverse impacts to resources. Alternative B provides a high level of protection of natural and cultural resources and integrates resource protection. Over the long term, Alternative B would be the least visually obtrusive, as the right-of-way is revegetated. Additionally, Alternative B would improve the visual quality of the historic district by removing the existing substation and would improve the visitor experience by removing utilities from areas used or viewed by visitors.

Comparison of Alternatives

Five project objectives were identified in Chapter 1. Table 1 compares the ability of the alternatives to meet the project objectives.

Table 1. Comparison of Alternatives

Project Objectives	Alternative A	Alternative B	Alternative C
Remove substation from public area to transportation/utility corridor	No	Yes	Yes
Provide safer and more enjoyable visitor experience	No	Yes	Yes
Provide environment for visitor separate from utility facilities and equipment	No	Yes	Yes
Improve visual quality within visitor core of Grand Canyon Village	No	Yes	Partially; overhead line would be visible crossing Center road

Summary Of Environmental Impacts

Table 2 is a matrix of environmental consequences to the impact topics identified in Chapter 1 as a result of implementing the alternatives.

Table 2. Summary of Environmental Consequences

Impact Topic	Alternative A No Action	Alternative B Preferred Alternative	Alternative C
Geology/Soils	No impact.	Impacts would be minor with implementation of best management practices to minimize soil erosion, soil profile mixing, and soil pollution. This alternative has the greatest potential to mix soil profiles because of the trench needed to bury the distribution line. A total of approximately 6.65 acres disturbed by construction activities; however, 5.45 acres are within an already disturbed area.	Impacts would be negligible with implementation of best management practices to minimize soil erosion, soil profile mixing, and soil pollution. A total of approximately 5.6 acres disturbed by construction activities; however, 4.4 acres are within an already disturbed area.
Biotic Communities Vegetation	Negligible impacts to vegetation from increased frequency of maintenance of the existing system. Cumulatively, impacts would be minor over the long-term.	Long-term impacts to vegetation would be minor. Approximately 6.65 acres of piñon/ juniper habitat disturbed during construction; however, 5.45 are within a disturbed area. Potential exists for invasion of weedy plants. Particularly cheatgrass, which already occurs in the project area. Implementation of mitigation measures would result in long-term minor impact.	Impacts expected to be similar to those described under Alternative B, except only 5.6 acres of piñon/juniper habitat would be disturbed during construction; however, 4.4 is within an already disturbed area.
Wildlife	Negligible impacts to wildlife from increased frequency of maintenance of the existing system. Cumulatively, impacts would also be negligible over the long-term.	Short-term disturbance of approximately 6.65 acres. All but 1.2 acres will be available to wildlife once construction is complete. Short-term impacts would be minor. Long-term impacts would be negligible. Removal of existing overhead lines would be beneficial to birds, particularly raptors.	Impacts expected to be similar to those described under Alternative B, except only 5.6 acres of habitat would be disturbed. Potential for electrocution could increase from adding 1½ miles of overhead powerlines to the Park's electrical system.
Threatened & Endangered Species	No impact.	Project may affect, but is not likely to adversely affect Mexican spotted owl and California condor. Project would have no effect on peregrine falcon, SENTRY milk vetch, and northern goshawk. Removal of existing overhead lines would be beneficial to birds, particularly raptors.	Similar to Alternative B, except that the amount of overhead lines would increase, which could increase collision potential for birds.

Impact Topic	Alternative A No Action	Alternative B Proposed Action	Alternative C
Cultural Resources	No impact.	Construction of the substation and distribution line would not affect any known historic resources. A minor beneficial impact would result from the potential to improve the visual quality of the Grand Canyon Village National Historic Landmark District by removing the existing substation.	Same as Alternative B.
Visitor Experience Recreation	This would result in a moderate long-term impact to the visitor experience, primarily from the increased safety of directing visitors within close proximity of the substation.	This would result in a minor short-term impact to the visitor experience, primarily from construction related activities. However, this alternative would result in a long-term moderate beneficial effect on recreational resources in the park by removing the substation from an area intended for visitor use.	Same as Alternative B.
Visual Quality	No direct impact. However, no opportunity to improve visual quality to the visitor core of the village by removing the substation and feeder lines.	Impacts would be short-term and minor after reclamation and revegetation of right-of-way for the underground line. Substation would diminish views for residents that use the existing utility corridor for recreational purposes. Removal of the existing substation and feeder line would improve visual quality in the village core.	Constructing an overhead line would alter the physical setting and visual quality of the existing landscape. This would have a long-term moderate impact.

Introduction

This chapter briefly describes the existing environment of the project area. This chapter is organized by the impact topics identified in Chapter 1.

Natural Resources

Geology/Soils

The proposed project area is in the southern portion of the Colorado Plateau. The soils tend to be shallow and poorly developed with frequent rock outcroppings. Underlying the soils is Kaibab limestone, a very porous and fossil-laden rock layer. Due to its porosity, this layer has numerous solution channels and sinks, creating subdued karst topography. Precipitation quickly penetrates the soil and rock layers, so little or no surface water is present except during heavy precipitation events.

Most of the area consists of silty/sandy soils with some scattered Kaibab limestone rocks on the surface and a few outcrops broken up into separated fist- and football-sized rocks. The largest exposures of bedrock Kaibab limestone occur directly underneath the existing overhead powerline. The largest of these measure a maximum of 10 feet by 5 feet. Detailed soils mapping was not completed for the project area. Soils have been identified using the General Soils Map of Arizona (Hendricks 1985). Soils within the project area consist of the Roundtop-Boysag Association.

Roundtop soils are moderately deep and well drained. Typically, they have a dark reddish gray gravelly clay loam surface layer about 3 inches thick. The subsoil is reddish brown gravelly heavy clay loam and gravelly clay about 33 inches thick. Roundtop soils occur on rolling plains and hillslopes with slopes ranging from 2 to 30 percent. These soils have moderate available water capacity and slow permeability. Runoff is medium and the hazard of erosion is moderate.

Boysag soils are shallow and well drained. Typically, they have a reddish brown and brown fine sandy loam surface layers about 3 inches thick. Below this is a layer of yellowish red clay about 8 inches thick. Below this, the bedrock is very pale brown calcareous sandstone having widely spaced fractures. Depth to bedrock ranges from 10 to 20 inches. Boysag soils occur on gently undulating hillslopes with slopes ranging from 0 to 8 percent. These soils have low available water capacity and slow permeability. Runoff is slow to medium and the hazard of erosion is slight to moderate.

Biotic Communities

Rather than attempt to identify and describe all species of plants and wildlife within the study area, general vegetation communities (habitats) with associated characteristic species, and species and habitats of particular concern are described in the following section.

Vegetation

The project area consists of mature ponderosa pine surrounded by juniper, pinyon pine and scrub oak habitat, on soils derived from Kaibab limestone. This habitat type is found on level to gently sloping

terrain of all aspects and is a transition from pinyon-juniper habitat to ponderosa pine forest. Associated species with this habitat type include big sagebrush (*Artemisia tridentata*), bluegrass (*Poa pratensis*), lupine (*Lupinus hillii*), banana yucca (*Yucca baccata*), cliff-rose (*Cowania mexicana*), creeping mahonia (*Berberis repens*), and snowberry (*Symphoricarpos spp.*). Table 3 lists the plant species noted during field surveys.

Table 3. Plant Species Noted During Field Surveys in 2001

SCIENTIFIC NAME	COMMON NAME
<i>Antennaria species</i>	Pussytoes
<i>Artemesia tridentada</i>	Big Sagebrush
<i>Aster species</i>	Aster
<i>Berberis fremontii</i>	Desert Holly
<i>Berberis repens</i>	Oregon Grape
<i>Boutaloua gracilis</i>	Blue Grama Grass
<i>Brickellia californica</i>	Brickelbush
<i>Bromus tectorum</i>	Cheatgrass
<i>Chamaebataria millefolium</i>	Fernbush
<i>Chrysothamnus nauseosus</i>	Rabbitbrush
<i>Elymus elymoides</i>	Squirrel Tail
<i>Eriogonum umbellatum</i>	Sulphur Flower
<i>Fallugia paradoxa</i>	Apache Plume
<i>Festuca arizonica</i>	Arizona Fescue
<i>Gutierrezia sarothrae</i>	Snakeweed
<i>Juniperus osteosperma</i>	Utah Juniper
<i>Leptodactylon pungens</i>	Leptodactylon
<i>Leucelene ericoides</i>	Leucelene
<i>Marrubium vulgare</i>	Horehound
<i>Opuntia species</i>	Prickly Pear
<i>Oryzopsis hymenoides</i>	Indian Rice Grass

Canopy cover north of the existing overhead powerline (the center line of the proposed distribution line to the west) and in the area proposed for the new substation is approximately 50%. The utility corridor, where the distribution line would be placed (to the east), has essentially no canopy cover.

Plants growing out of bedrock exposures included Apache plume (*Fallugia paradoxa*), Aster (*Aster spp.*), dropseed (*Sporobolus spp.*), fernbush (*Chamaebataria amillefolium*), mullein (*Verbascum thapsus*), snakeweed (*Gutierrezia sarothrae*), and sulphur flower (*Eriogonum umbellatum*).

Exotic Vegetation and Noxious Weeds

One hundred fifty-nine exotic plant species are known to exist in Grand Canyon National Park. Of these, fourteen are listed on Arizona's noxious weed list. These species and Arizona State status are listed in Table 4.

Table 4. Arizona Noxious Weeds Present in Grand Canyon National Park

SCIENTIFIC NAME	COMMON NAME	ARIZONA STATE STATUS
<i>Chondrilla juncea</i>	Rush Skeletonweed	prohibited
<i>Aegilops cylindrica</i>	Jointed Goatgrass	restricted
<i>Alhagi camelorum</i>	Camelthorn	restricted
<i>Cardiara draba</i> **	White Top	restricted
<i>Centaurea maculosa</i>	Spotted Knapweed	restricted
<i>Linaria dalmatica</i> **	Dalmatian Toadflax	restricted
<i>Onopardum acanthium</i> **	Scotch Thistle	restricted
<i>Cenchrus incertus</i>	Field Sandbur	regulated
<i>Convolvulus arvensis</i>	Field Bindweed	regulated
<i>Tribulus terrestris</i>	Puncture Vine	regulated
<i>Acroptilon repens</i> **	Russian Knapweed	restricted
<i>Centraurea diffusa</i>	Diffuse Knapweed	restricted
<i>Elymus repens</i>	Quackgrass	restricted
<i>Cirsium arvense</i>	Canada thistle	prohibited

** Within Grand Canyon Village, the species of highest concern based on relative abundance, potential spread, or potential impact.

Thirteen additional species are of high concern at Grand Canyon Village based on significance of impact and feasibility of control. These species are listed in Table 5.

Table 5. Arizona Noxious Weeds of High Concern at Grand Canyon Village

SCIENTIFIC NAME	COMMON NAME
<i>Agrostis stolonifera</i>	Redtop, Bentgrass
<i>Bromus tectorum</i>	Cheatgrass
<i>Bromus inermis</i>	Smooth brome
<i>C. virgata</i>	Squarrose knapweed
<i>Conyza canadensis</i>	Horseweed
<i>Dactylis glomerata</i>	Orchardgrass
<i>Erodium cicutarium</i>	Filaree
<i>Hordeum murinum</i>	Rabbit barley
<i>Marrubium vulgare</i>	Horehound
<i>Poa pratensis</i>	Kentucky bluegrass
<i>Salvia aethiopis</i>	Mediterranean sage
<i>Sonchus asper</i>	Spiny sow-thistle
<i>Sorghum halapense</i>	Johnson grass

An exotic plant survey was completed by GCNP staff in October 2001. They noted that the area recently has received a significant amount of vegetative disturbance from a large firebreak clearing. Because of this disturbance and proximity to the developed area, there are high concentrations of non-natives in the area. Cheatgrass was found within the project corridor; and filagree and horehound were found within 150 feet of the project corridor. Additional non-native plants found near the project area include bull thistle, mullein, dandelion, and cheeseweed (NPS 2001b).

Cheatgrass is an annual grass from southwestern Asia. It occurs throughout most of the United States and is very persistent. Cheatgrass is a species of high concern for the Grand Canyon Village area because it is currently not abundant in this area, difficult to eradicate once it is established, a prolific seed producer, and a colonizer of drier sites such as those at Grand Canyon (*Ibid.*).

Filagree is an annual that is very common along roadsides, fields, and in the semi-desert. It blooms in the spring and continues blooming into the fall. The leaves and deep roots have a strong pungent smell. It has long, narrow, pointed bill-like seed pods. Filagree is a species of high concern for the Grand Canyon Village area (Southwest Exotic Plant Information Clearinghouse 2002).

Horehound is a perennial that occurs on open, disturbed sites, and along roadsides. It has white-woolly stems that are square (4-sided) in cross-section. Horehound flowers from April to October. Horehound is a species of high concern for the Grand Canyon Village area (*Ibid.*).

Wildlife

The project proposed lies within the established "Natural Zone" (NPS 1995a). Many native species, including mule deer (*Odocoileus hemionus*), Abert squirrel (*Sciurus aberti*), several species of forest dwelling bats, bobcat (*Lynx rufus*), and mountain lion (*Felis concolor*), use this area on a year round basis or as a movement corridor between summer and winter range. In addition, elk (*Cervus elaphus nelson*) are using this area in larger numbers than in the recent past, because of habitat restoration through the use of prescribed fire.

Threatened and Endangered /Special Status Species

Table 6 shows the threatened, endangered, and special status species with the potential to occur within the project area. The table is followed by a brief discussion of each species. Five species of concern inhabit the general vicinity of the proposed action: the Mexican spotted owl, California condor, Sentry milk vetch, northern goshawk, and peregrine falcon.

Table 6. Species of Concern with Potential to Occur in the Project Area

SPECIES	STATUS	POTENTIAL TO OCCUR IN PROJECT AREA
Mexican Spotted Owl	Threatened	Unlikely, no nesting habitat within 0.5 miles. Roosting and foraging habitat available.
California Condor	Endangered	Yes, but project area not suitable for nesting. Roosting and foraging habitat available.
Sentry Milk-Vetch	Endangered	Yes, three separate populations are known to occur in the park. Surveys in the project area did not discover any new populations.
Northern Goshawk	State candidate species and Wildlife of Special Concern	Yes, nearest known territory is approximately 3/4 miles southeast of the project area. Roosting and foraging habitat available. Surveys according to protocol should be completed prior to beginning construction activities to determine if goshawks are using the habitat surrounding the project area.
Peregrine Falcon	Delisted	Yes, closest territory is approximately 1 mile to the northwest.

Peregrine falcon is included on the list, even though it is not a state listed species and is no longer a federally listed species. This is because of the size and extent of the peregrine population within the park – making their participation in a monitoring program being developed by the U. S. Fish and Wildlife Service important. An initial goal of monitoring is to have at least 25 peregrine territories in the Colorado Plateau and adjacent low desert regions. Grand Canyon National Park has not been contacted to date on

participation in this monitoring effort, but participation in the monitoring program is likely. During this monitoring effort, the park will continue to consider peregrine falcons a species with special status.

In-depth discussion of federally listed species for various projects on the South Rim is the subject of a separate Biological Assessment (BA) prepared by the NPS. The BA presents a detailed analysis of the potential impacts to federally listed species from several projects proposed on the South Rim, including the proposed substation relocation. U.S. Fish and Wildlife Service concurred with the park's determination that implementation of this project, along with many other construction projects in the park over the next five years, may affect, but is not likely to adversely affect, the Mexican spotted owl, California condor, SENTRY milk vetch, bald eagle, or their habitat (USFWS 2002). As required mitigation of the BA, the U.S. Fish and Wildlife Service would be consulted prior to a decision being made on this proposal (NPS 2002).

Cultural Resources

The National Historic Preservation Act requires agencies to take into account the effects of their actions on properties listed or eligible for listing on the National Register of Historic Places. The process begins with an identification and evaluation of cultural resources for National Register eligibility, followed by an assessment of effect on those eligible resources, and concluding after a consultation process. If an action could change in any way the characteristics that qualify the resource for inclusion on the National Register, it is considered to have an effect. No historic properties affected means that no cultural resources are affected. No adverse effect means there could be an effect, but the effect would not be harmful to those characteristics that qualify the resource for inclusion on the National Register. Adverse effect means the effect could diminish the integrity of the characteristics that qualify the resource for the National Register.

Historic

The Grand Canyon Village National Historic Landmark District is recognized for exceptional significance as a National Historic Landmark (NHL), encompassing an extensive assemblage of 212 buildings and structures, 44 landscape structures and one site. Historic properties contributing to the district's significance span the period of significance from 1898 to 1941, associated with early tourism development at the South Rim, and subsequent NPS expansion of the developed area. The arrival in 1901 of the Santa Fe Railway and the Fred Harvey Company provided the impetus for substantial tourist-related construction in the area prior to establishment of Grand Canyon National Park in 1919. The town plan for Grand Canyon Village divided it into separate areas for residential, commercial and civic uses, which make it not only an exceptional example of NPS town planning, but also a highly significant example of American town planning of the 20s. The district retains a high degree of integrity reflecting the 1924 NPS master plan for the village; the original street plan, organization of developed areas, natural and constructed landscaping, and overall setting remain largely intact (NPS 1995b).

Most of the historic district's structures date from the 1930s, constructed in the prevailing rustic style that incorporated native building materials, primarily those of wood and stone. Four early district structures built in the "Craftsman Rustic" and "NPS Rustic" styles are designated individually as National Historic Landmarks: El Tovar Hotel (1905), Grand Canyon Railway Depot (1910), Grand Canyon Powerhouse (1926), and Grand Canyon Park Operations Building (1929). Two additional NHL's, Hopi House (1905) and Lookout Studio (1914) were built by the Santa Fe Railway and designed by renowned architect Mary Jane Colter in her own distinctive rustic style. While located within the Grand Canyon Village National Historic Landmark District, Hopi House and Lookout Studio are also grouped thematically in the Mary Jane Colter NHL Historic District together with Hermits Rest and Desert View Watchtower, two other Colter-designed buildings.

As permanent accommodations were added to the South Rim, reliable means of heat, water, sewage disposal, and other services became necessary. Utility buildings, such as the Powerhouse were added to this area and combined the earlier rustic park style with a Swiss chalet theme, typical of park hotels from the late 20s to early 30s.

Contributing features of the NHL district that could be affected by relocating the substation include:

- Horse Barn or Livery Stables (NR #563)
- Powerhouse (NR # 567)
- Purchasing and Receiving Building, formerly Laundry (NR #569)
- Maintenance Shop, formerly Paint Shop (NR #572)
- Fred Harvey Mule Barn (NR #562)

The power substation was built next to the Powerhouse building during the mid-50s and redirected power to the South Rim from a regional source. The substation is a non-contributing feature to the NHL designation.

A cultural landscape inventory was completed in 1995 for Grand Canyon Village during its nomination as a NHL district. This inventory is being updated in a cultural landscape report that is about 90% complete. In addition to the contributing buildings mentioned in the previous section, several features are found within close proximity to the existing substation that contribute to the NHL designation. These include the terracing of slopes of Bright Angel Wash, the railroad grade north of the Utility Area, the ditch in the bottom of Bright Angel Wash, Bright Angel Wash, the access road to the loading dock at Powerhouse, pedestrian paths around the Community building, Village Loop Drive, the railroad tracks north of the Utility Area, the rail “wye” to the west of the Utility Area, the service road alignment west of the Purchasing and Receiving building, the rubble wall north of the railroad tracks, the rubble wall and stair northeast of the Powerhouse building, stands of trees in Bright Angel Wash, the grove around the Community building, and the wooded area between the housing and utility zones. Additionally the long exterior view of buildings around the central utility yard and the views into the Utility area from above (Bright Angel Lodge) are contributing features, as well as the spatial organization of the Central utility yard, railroad corridor, yard between the livery stable and mule barn, corral area, substation area, and the Community building area.

Visitor Experience

Recreation Resources

Grand Canyon’s natural and cultural resources in addition to its clean air, temperate climate, solitude, generally unspoiled environment, and opportunities for outdoor experiences, all combine to make the Park a major national and international visitor attraction. The Park is widely considered one of the world’s most beautiful natural areas with its enormous proportions and the ever-changing play of sunlight and shadow on its geologic formations, in addition to its large diversity of habitat (NPS 1995a).

The South Rim is the primary destination for most of the over four million visitors arriving each year. The vision for the South Rim is to allow visitors direct access to Canyon panoramas, and to offer a range of visitor experiences ranging from more social experiences in Grand Canyon Village to solitary experiences.

The General Management Plan establishes the goal of preserving the wilderness threshold experience along the Canyon's rim. Actions proposed in the plan are intended to ensure enjoyable experiences as visitors arrive at the rim. According to the General Management Plan, the South Rim should accommodate large numbers of visitors, but dense crowds and related conflicts and resource impacts

should be minimized. Visitors should be able to experience solitude in natural settings as well as social exchange in developed areas (NPS 1995a).

The Heritage Education Campus is proposed for the heart of historic Grand Canyon Village. The campus will provide an in-depth education and discovery campus for visitors. The focal point of the Heritage Education Campus will be the historic Powerhouse building. Connected by a central plaza, four other historic structures (the Livery Stable, the Mule Barn, the Laundry Building, and the Community Building) will create the core of the campus. An accessible pedestrian bridge spanning the railroad tracks will link the campus with the visitor facilities on the rim. A transit area is also planned adjacent to the campus, providing visitor's easy access to the mass transit system.

Visual Quality

The Grand Canyon is valued worldwide as one of the most powerful and inspiring scenic landscapes. It is widely considered one of the world's most beautiful areas by providing a great diversity in scenery and panoramic vistas.

The visual quality or character of the landscape surrounding the substation site and distribution lines is typical of Grand Canyon Village – that is, it has been greatly modified by man-made structures, roads, utilities, and vehicles. However, the gentle topography of the South Rim area combined with the varied canopy of trees (mature ponderosa pines, pinyon pines, juniper, and oak) provides a moderately high degree of visual absorption capacity for the landscape.

The area proposed for the new substation is not visible from any visitor use areas. However, the distribution line would be visible from Center Street. The existing substation and feeder lines that would be removed are visible within Grand Canyon Village.

Introduction

This chapter describes the direct, indirect, and cumulative environmental consequences of the alternatives. It is organized by impact topic, with environmental consequences discussed under each alternative. Environmental consequences are the effects and impacts on the physical, biological, social, and economic environment that may be caused by implementing an alternative. Environmental consequences result from the level and type of development that either is proposed or may be expected from each alternative.

Methodology

All alternatives have been evaluated for their effects on the resources and values that were identified during the scoping process (also known as the impact topics). To determine the relative change in resource conditions, the characterization of effects was based on the following factors:

Beneficial: A positive change in the condition or appearance of the resource or a change that moves the resource toward a desired condition.

Adverse: A change that moves the resource away from a desired condition or detracts from its appearance or condition.

Direct: An effect that is caused by an action and occurs in the same time and place.

Indirect: An effect that is caused by an action but is later in time or farther removed in distance, but is still reasonably foreseeable.

Short-term: An effect that within a short period of time would no longer be detectable as the resource is returned to its predisturbance condition or appearance, generally less than 5 years.

Long-term: An effect on a resource or its condition that does not return the resource to its predisturbance condition or appearance, and for all practical purposes is considered permanent.

The threshold or intensity of the effect – whether negligible, minor, moderate, or major – is specifically defined in the methodology section at the beginning of the discussion for each impact topic. Threshold values were developed based on federal and state standards, consultation with regulators from applicable agencies, and discussions with resource specialists.

Cumulative Impacts

All the alternatives were also evaluated based on other past, present, and reasonably foreseeable future action (regardless of who undertakes these additional actions). Impacts from these actions could result in individually minor effects, but when considered cumulatively, could result in more intense effects taking place over a period of time.

The largest foreseeable future action that could occur in the vicinity of the proposed substation and distribution line is the implementation of a transit system from Tusayan to Mather Point, with a spur into the village. This project was identified in the General Management Plan. Alternative transportation systems being evaluated include light rail, buses on a dedicated roadway, and conventional buses on shared roads. Planning and environmental documentation are ongoing for this project, and implementation could occur within the next five years.

Another foreseeable future action in the vicinity of the existing substation would be the development of the Heritage Education Campus. Planning and design are still in preliminary stages. Park staff have completed a park-wide Comprehensive Interpretive Plan that includes themes for the Heritage Education Campus. Environmental documentation will be completed for this project and could occur within the next few years.

Other foreseeable future actions that involve new construction include the Albright Training Center, NPS maintenance facility, mule barn, greenway, back country permits office, learning center housing, and Pinyon Park housing. Foreseeable future actions that involve rehabilitation and/or reuse of existing facilities include the Heritage Education Campus, Grand Canyon Village restrooms, Ranger Operations building, Yavapai observation station, visitor center/park headquarters, and a bike rental facility.

Cultural Resources and Section 106 of the National Historic Preservation Act

In this EA/AEF, impacts to cultural resources are described in terms of type, context, duration, and intensity, as described above, which is consistent with the regulations of the Council on Environmental Quality (CEQ) that implement the NEPA. These impact analyses are intended, however, to comply with the requirements of both NEPA and Section 106 of the National Historic Preservation Act (NHPA), as well as the General Management Plan's Section 106 Programmatic Agreement. In accordance with the Advisory Council on Historic Preservation's regulations implementing Section 106 of the NHPA (36 CFR §800, *Protection of Historic Properties*), impacts to cultural resources were identified and evaluated by (1) determining the area of potential effects; (2) identifying cultural resources present in the area of potential effects that were either listed in or eligible to be listed in the National Register of Historic Places; (3) applying the criteria of adverse effect to affected cultural resources either listed in or eligible to be listed in the National Register; and (4) considering ways to avoid, minimize or mitigate adverse effects.

Under the Advisory Council's regulations a determination of either adverse effect or no adverse effect must also be made for affected cultural resources. An adverse effect occurs whenever an impact alters, directly or indirectly, any characteristic of a cultural resource that qualify it for inclusion in the National Register (e.g. diminishing the integrity of the resource's location, design, setting, materials, workmanship, feeling, or association). Adverse effects also include reasonably foreseeable effects caused by the preferred alternative that would occur later in time, be farther removed in distance or be cumulative (36 CFR §800.5, *Assessment of Adverse Effects*). A determination of no adverse effect means there is an effect, but the effect would not diminish in any way the characteristics of the cultural resource that qualify it for inclusion in the National Register.

CEQ regulations and the NPS' *Conservation Planning, Environmental Impact Analysis and Decision-making* (Director's Order-12) also call for a discussion of the appropriateness of mitigation, as well as an analysis of how effective the mitigation would be in reducing the intensity of a potential impact (e.g. reducing the intensity of an impact from major to moderate or minor). Any resultant reduction in intensity of impact because of mitigation, however, is an estimate of the effectiveness of mitigation under NEPA only. It does not suggest that the level of effect as defined by Section 106 is similarly reduced. Although adverse effects under Section 106 may be mitigated, the effect remains adverse.

A Section 106 summary is included in the impact analysis sections for cultural resources under the preferred alternative. The Section 106 Summary is intended to meet the requirements of Section 106 and is an assessment of the effect of the undertaking (implementation of the alternative) on cultural resources,

based upon the criterion of effect and criteria of adverse effect found in the Advisory Council's regulations.

Impairment of Park Resources or Values

In addition to determining the environmental consequences of the alternatives, NPS policy (NPS 2001c) requires analysis of potential effects to determine whether or not actions would impair park resources.

The fundamental purpose of the national park system, established by the Organic Act and reaffirmed by the General Authorities Act, as amended, begins with a mandate to conserve park resources and values. NPS managers must always seek ways to avoid, or to minimize to the greatest degree practicable, adverse impacts on park resources and values. However, the laws give the NPS the management discretion to allow impacts to park resources and values when necessary and appropriate to fulfill the purposes of the park, as long as the impact does not constitute impairment of the affected resources and values. Although Congress has given the NPS the management discretion to allow certain impacts within parks, that discretion is limited by the statutory requirement that the NPS must leave park resources and values unimpaired, unless a particular law directly and specifically provides otherwise. The prohibited impairment is an impact that, in the professional judgment of the responsible NPS manager, would harm the integrity of park resources or values, including the opportunities that otherwise would be present for the enjoyment of those resources or values. An impact to any park resource or value may constitute impairment. An impact would be more likely to constitute impairment to the extent that it affects a resource or value whose conservation is:

- Necessary to fulfill specific purposes identified in the establishing legislation or proclamation of the park;
- Key to the natural or cultural integrity of the park; or
- Identified as a goal in the park's GMP or other relevant NPS planning documents.

Impairment may result from National Park Service activities in managing the park, visitor activities, or activities undertaken by concessioners, contractors, and others operating in the park.

Natural Resources

Geology/Soils

Methodology

All available information on geological resources in the park was compiled. The information is based on the Park's GMP (NPS 1995a).

The thresholds of change for the intensity of an impact are defined as follows:

Negligible: An action that could result in a change to a natural physical resource, but the change would be so small that it would not be of any measurable or perceptible consequence. Soils would not be affected or the effects to soils would be below or at the lower levels of detection. Any effects to soil productivity or fertility would be slight and no long-term effects to soils would occur.

Minor: An action that could result in a change to a natural physical resource, but the change would be small and localized and of little consequence. The effects to soils would be detectable. Effects to soil productivity or fertility would be small, as would the area affected. If mitigation were needed to offset adverse effects, it would be relatively simple to implement and would likely be successful.

Moderate: An action that would result in a change to a natural physical resource; the change would be measurable and of consequence. The effect on soil productivity or fertility would be readily apparent, likely long-term, and result in a change to the soil character over a relatively wide area. Mitigation measures would probably be necessary to offset adverse effects and would likely be successful.

Major: An action that would result in a noticeable change to a natural physical resource; the change would be measurable and result in a severely adverse or major beneficial impact. The effect on soil productivity or fertility would be readily apparent, long-term, and substantially change the character of the soils over a large area in and out of the monument. Mitigation measures to offset adverse effects would be needed, extensive, and their success could not be guaranteed.

Alternative A – No Action

Direct/Indirect Impacts: As no new construction activities would occur, there would be no change in or impact to geological formations or soil conditions.

Cumulative Impacts: No action in this analysis means that the power substation and associated distribution line would not be built, and the existing substation and power lines that connect the substation to the power distribution system would not be removed. Therefore, there would be no cumulative impacts to geology or soils as a result of implementing this alternative.

Impairment: There would be no impairment of the Grand Canyon National Park's resources or values if this alternative were implemented. This is concluded because no major adverse impacts would occur. Specifically, no major adverse impacts would occur to necessary resources needed to fulfill specific purposes identified in the establishing legislation or proclamation of the park, or resources that are key to the natural or cultural integrity of the park, or resources identified as a goal in the park's general management plan or other relevant NPS planning documents.

Conclusion: There would be no impact to geology or soils from implementing no action.

Alternative B – Preferred Alternative

Direct/Indirect Impacts: The potential for adverse impacts on geological formations is negligible, because construction of the distribution line would be within previously disturbed areas and existing rights-of-way, and substation construction requires only surface and near-surface disturbance. Potential effects on soils from project construction would be minor and would include increased soil erosion, soil compaction, soil removal or soil profile mixing, and soil pollution from chemical spills during construction.

No new access roads would be built, so potential soil erosion would be limited to the substation and distribution line, and therefore, minor in intensity. Soils within the proposed area designated for construction of the substation and distribution line would be graded and cleared of vegetation, which would increase the potential for soil erosion at a rate higher than that occurring naturally. The total length of the proposed distribution line is approximately 1.5 miles. In clearing a 30-foot-wide corridor in preparation for the trench to bury the line, a total area of approximately 5.45 acres would be re-disturbed. Much of this area was disturbed in the last year to install a sewer line. The substation is proposed for an area that has received little previous disturbance, and its construction would disturb approximately 1.2 acres. Total ground disturbance would be approximately 6.65 acres.

Soil compaction may occur where heavy equipment traverses cross-country. Compaction lowers the value of soil as a plant medium and may result in increased erosion. Compaction would be expected along the distribution line and at the new substation site, but would be minor in intensity due to the shallow, coarse, and stony nature of the soils within the project area.

Trenching for an underground distribution line would have the greatest potential of any of the alternatives to mix soil profiles. Measures would be implemented to segregate topsoil from the other soils excavated from the trench, in order to minimize this impact to a minor level. Rocks excavated from the trench, which are too large to be returned to the trench once the distribution line was buried, would be spread across the right-of-way or removed from the site and taken to an approved dump site.

All potential impacts to soils would be avoided or reduced to minor, short-term levels by implementing best management practices (BMP's) during construction. For example, minor, temporary soil erosion may occur during construction, but revegetating the disturbed areas would preclude any long-term erosion potential. Soil pollution potential would be minimized by careful handling of oils, fuel, and other chemicals; by maintaining construction vehicles, regularly; by allowing construction vehicle maintenance on the right-of-way to only occur during emergency situations; and by immediately cleaning up any fluid spills.

Once the line is buried, it would require minimal maintenance. Routine maintenance would not be scheduled, but would occur only when a power outage occurs. This would have a negligible impact on geology or soils.

Removal of the existing substation and feeder line next to the Powerhouse building would temporarily disturb the soils in the immediate area. This area is relatively flat, which would limit significant soil erosion from water runoff. This area has already been disturbed and removal of these structures would be expected to have a minor impact on soils. Once the materials are removed from the site, the area would be graded and left in a condition suitable for the eventual construction of the Heritage Education Campus.

Cumulative Impacts: The combined impact of this proposal with past, present, and foreseeable future actions would result in the continued compaction and displacement of soils from construction and development projects. Compaction would be limited in intensity due to the shallow, coarse, and stony nature of the soils along the South Rim. Displacement from soil erosion would probably be the impact of greatest concern because of the extent of soil disturbed during construction. However, soil loss would be minimized through implementation of standard erosion control measures. Cumulatively, impacts to soils would be minor to moderate.

Impairment: There would be no impairment of the Grand Canyon National Park's resources or values if this alternative were implemented. This is concluded because no major adverse impacts would occur. Specifically, no major adverse impacts would occur to necessary resources needed to fulfill specific purposes identified in the establishing legislation or proclamation of the park, or resources that are key to the natural or cultural integrity of the park, or resources identified as a goal in the park's general management plan or other relevant NPS planning documents.

Conclusion: Short-term impacts to soils, primarily from construction vehicles driving back and forth over the project area, would be minor. Long-term impacts, primarily erosion potential and the potential for mixing soil profiles during trenching would also be minor. Cumulatively, impacts would be minor to moderate.

Alternative C

Direct/Indirect Impacts: Impacts to geology and soils would be similar to those described under Alternative B. However, instead of trenching an underground line, an overhead line would be installed.

This would minimize the potential for mixing soil profiles because the substation would require only minor surface grading. Existing poles along the western portion of the distribution line would be replaced, requiring removal of seven poles and re-auguring the holes. Additionally, new poles would be placed approximately every 300 feet along the alignment to the east of the substation, requiring approximately 15 new poles. Under a worst-case scenario where a 50-foot diameter construction area is disturbed, approximately 0.2 acres would be disrupted at each pole site. Total ground disturbance would be approximately 5.6 acres (4.4 acres for the distribution line and 1.2 acres for the substation). As discussed under Alternative B, much of the alignment for the overhead poles would be within a corridor that was recently disturbed for the sewer line project.

All potential impacts to soils would be avoided or reduced to minor, short-term levels by implementing best management practices (BMP's) during construction as described under Alternative B.

Routine maintenance and operation of the substation and distribution line (involving yearly inspections of the line) would have a negligible impact on geology and soils.

Removal of the existing substation and feeder line would have the same impact as described under Alternative B.

Cumulative Impacts: Cumulative impacts would be the same as those described under Alternative B.

Impairment: There would be no impairment of the Grand Canyon National Park's resources or values if this alternative were implemented. This is concluded because no major adverse impacts would occur. Specifically, no major adverse impacts would occur to necessary resources needed to fulfill specific purposes identified in the establishing legislation or proclamation of the park, or resources that are key to the natural or cultural integrity of the park, or resources identified as a goal in the park's general management plan or other relevant NPS planning documents.

Conclusion: Direct and indirect impacts would be minor, primarily from the disturbance of approximately 1.2 acres for the construction of a substation and redistributing 4.4 acres for the overhead powerline. Cumulatively, impacts would also be minor.

Biotic Communities

Vegetation

Methodology

All available information on known native vegetation, as well as exotic plants and noxious weeds was compiled. Where possible, map locations of known populations were compared with locations of the proposed substation, distribution line, and existing substation. Predictions about short- and long-term site impacts were based on previous studies and recent monitoring data.

The thresholds of change for the intensity of an impact are defined as follows:

Negligible: An action that would result in no native vegetation disturbed or limited disturbance to individual plants, but there would be no effect on native species populations. The effects would be short-term, on a small scale, and no species of special concern would be affected. Additionally, the action could result in the spread of noxious weeds, but the change would be so small that it would not be of any measurable or perceptible consequence.

Minor: An action that could result in disturbance to some individual native plants and could also affect a relatively minor portion of that species' population. Mitigation to offset adverse effects, including special measures to avoid affecting species of special concern, could be required and would be effective. Additionally, the action could result in the spread of noxious weeds. The change would be small and localized and of little consequence.

Moderate: An action that could result in disturbance to some individual native plants and would also affect a sizeable segment of the species' population in the long-term and over a relatively large area. Mitigation to offset adverse effects could be extensive, but would likely be successful. Some species of special concern could also be affected. Additionally, the action could result in the spread of noxious weeds. The change would be measurable and of consequence to the species or resource but more localized.

Major: An action that could result in a considerable long-term effect on native plant populations, including species of special concern, and could affect a relatively large area inside or outside the park. Mitigation measures to offset the adverse effects would be required, extensive, and success of the mitigation measures would not be guaranteed. Additionally, the action could have a noticeable invasion of noxious weeds. The change would be measurable and result in a severely adverse or major beneficial impact, and possible permanent consequence, upon the biotic community or resource.

Alternative A – No Action

Direct/Indirect Impacts: As no new ground disturbing activities would occur, there would be no direct impacts to vegetation. However, maintenance on the existing lines would be expected to increase in frequency as the distribution lines reach their expected age of usefulness. Maintenance of the line would require driving on the right-of-way to repair poles and/or segments of the line, which could increase the potential for introduction of exotic plants or noxious weeds. This would be considered a negligible impact.

Cumulative Impacts: Existing development has created disturbances that have allowed the introduction of exotic plants and noxious weeds into the park. Increased maintenance combined with foreseeable future projects in the area would increase the potential for noxious weeds and exotic plants to spread in the park at a rate that may be difficult for the existing control programs to manage. Mitigation measures would be implemented for any future projects to reduce the potential for spread or introduction of exotic plants or noxious weeds.

Impairment: There would be no impairment of the Grand Canyon National Park's resources or values if this alternative were implemented. This is concluded because no major adverse impacts would occur. Specifically, no major adverse impacts would occur to necessary resources needed to fulfill specific purposes identified in the establishing legislation or proclamation of the park, or resources that are key to the natural or cultural integrity of the park, or resources identified as a goal in the park's general management plan or other relevant NPS planning documents.

Conclusion: There would be long-term negligible impacts to vegetation. Cumulatively, impacts to vegetation would be minor over the long-term.

Alternative B – Preferred Alternative

Direct/Indirect Impacts. Direct impacts to vegetation would be minor as vegetation (either in the form of natural reintroduction and reclamation seeding) would grow back over the top of the distribution line. No sensitive vegetation areas would be impacted under this alternative. Impacts to vegetation caused by Alternative B would be primarily confined to the immediate area of the new substation and underground distribution line. Vehicle access would be confined to existing roads, which already are primarily void of vegetation.

Approximately 1.2 acres of ponderosa pine and piñon/juniper habitat would be cleared for construction of the substation. Constructing the distribution line would involve clearing a 30-foot-wide corridor, involving approximately 5.45 acres of previously disturbed habitat within the utility corridor. No old growth would be affected by either the substation or distribution line construction. As proposed, topsoil (the first 12-inches or so of soil with organic matter in it) would be segregated from the other material excavated from the trench. However, if the topsoil is not properly segregated from the other soil layers as proposed, or is turned under, or mixed with other soils that have no organic matter, the substrate may not be able to adequately support a seed bed. Therefore, natives may not re-establish and barren or weedy spots could propagate. Most of the area intended for the substation would be covered with gravel or some other material, which would preclude revegetation. This would result in the loss of 1.2 acres of vegetation.

Vegetation removal would reduce nutrient capital stored in the removed biomass. However, the overall function of this vegetation in context of the Grand Canyon Village would negligibly change because this habitat is currently degraded from the high disturbance levels caused by previous utility installation and human use. Proper revegetation after construction of the substation and distribution line would allow disturbed areas to return to a more native condition within a few growing seasons after construction and would limit the potential for introduction of noxious weeds.

With soil disturbance and exposure comes the potential opportunity for weedy plant invasion. Weed seed is carried from site to site on the tires of equipment and vehicles, in soils, and on clothing. Many weedy species are annuals and need very minimal requirements for establishment and propagation. As weedy species increase, native plants are often displaced. This displacement leads to a decrease in palatable and suitable forage for wildlife, in nesting and resting habitat for birds, and natural diversity indicative of natural ecosystems.

Cheatgrass exists at the site, and construction equipment and site work could spread cheatgrass seeds throughout the disturbed area and provide a seedbed for establishment. To reduce the short-term risk of spread and introduction, mitigation measures would be implemented with this alternative, such as pressure washing equipment, pre-treatment, and staging area restrictions. However, the persistence of this species would likely allow individual plants to grow on the disturbed site after construction, which would constitute a short-term minor adverse impact. Post-construction monitoring, revegetation efforts, and control treatments would reduce the risk of cheatgrass and other exotic vegetation colonizing the site and becoming a long-term problem.

Cumulative Impacts: Existing development has created disturbances that have allowed introduction of exotic plants and noxious weeds into the park. Constructing the proposed substation and distribution line combined with foreseeable future projects in the area would increase the potential for noxious weeds and exotic plants to spread in the park at a rate that may be difficult for the existing control programs to manage. Mitigation measures would be implemented for any future projects to reduce the potential for spread or introduction of exotic plants or noxious weeds. Therefore, cumulative impacts would be minor and long-term.

Impairment: There would be no impairment of the Grand Canyon National Park's resources or values if this alternative were implemented. This is concluded because no major adverse impacts would occur. Specifically, no major adverse impacts would occur to necessary resources needed to fulfill specific purposes identified in the establishing legislation or proclamation of the park, or resources that are key to the natural or cultural integrity of the park, or resources identified as a goal in the park's general management plan or other relevant NPS planning documents.

Conclusion: By revegetating the areas disturbed by construction, long-term impacts to vegetation would be minor. Cumulative impacts would also be minor and long-term.

Alternative C

Direct/Indirect Impacts. Impacts to vegetation would be similar to that described under Alternative B. A total of approximately 1.2 acres of ponderosa pine and piñon/juniper habitat would be cleared during the construction of the substation, and approximately 4.4 acres of recently disturbed habitat would be redisturbed for the construction of the overhead distribution line. No sensitive vegetation areas would be impacted under this alternative.

Cumulative Impacts: Existing development has created disturbances that have allowed introduction of exotic plants and noxious weeds into the park. Constructing the proposed substation and distribution line combined with foreseeable future projects in the area would increase the potential for noxious weeds and exotic plants to spread in the park at a rate that may be difficult for the existing control programs to manage. Mitigation measures would be implemented for any future projects to reduce the potential for spread or introduction of exotic plants or noxious weeds. Therefore, cumulative impacts would be minor and long-term.

Impairment: There would be no impairment of the Grand Canyon National Park's resources or values if this alternative were implemented. This is concluded because no major adverse impacts would occur. Specifically, no major adverse impacts would occur to necessary resources needed to fulfill specific purposes identified in the establishing legislation or proclamation of the park, or resources that are key to the natural or cultural integrity of the park, or resources identified as a goal in the park's general management plan or other relevant NPS planning documents.

Conclusion: By revegetating the areas disturbed by construction, long-term impacts to vegetation would be minor. Cumulative impacts would also be minor and long-term.

Wildlife

Methodology

All available information on known wildlife corridors and special use areas was compiled. Where possible, map locations of sensitive areas were compared with locations of the proposed substation and distribution lines. The thresholds of change for the intensity of an impact are defined as follows:

Negligible: An action that could result in changes that would be so slight that they would not be of any measurable or perceptible consequence to the wildlife species' population. Wildlife would not be affected or the effects would be at or below the level of detection, and would be short-term.

Minor: An action that could result in changes to wildlife that would be detectable, although the effects would be localized, and would be small and of little consequence to the species' population. Mitigation measures, if needed to offset adverse effects, would be simple and successful.

Moderate: An action that could result in changes to wildlife that would be readily detectable, long-term and localized, with consequences at the population level. Mitigation measures, if needed to offset adverse effects, would be extensive and likely successful.

Major: An action that could result in changes to wildlife that would be obvious, long-term, and would have substantial consequences to wildlife populations in the region. Extensive mitigation measures would be needed to offset any adverse effects and their success would not be guaranteed.

Alternative A – No Action

Direct/Indirect Impacts: Since no ground disturbing activities are proposed under this alternative, there would be no direct impacts to wildlife. Increased maintenance of the existing distribution lines would

result in temporary and in-frequent disturbance to wildlife that use the utility corridor. This impact would be considered negligible.

Cumulative Impacts: Wildlife habitat has been lost in and around the project area from past developments. Although neither a substation or distribution line would be built under this alternative, the increased frequency of maintenance to the distribution lines may disturb wildlife, but at a negligible level. Future projects (e.g. the mass transit system) may increase the potential for wildlife to be killed by mass transit vehicles (trains or buses), but would reduce the potential for wildlife to be killed from private vehicles, as most visitors would park their private vehicles in Tusayan and use the mass transit system in the park. Collectively, all the projects in this area have been designed to use areas that have already been disturbed to the extent practicable in order to minimize impacts to wildlife habitat and the environment.

Impairment: There would be no impairment of the Grand Canyon National Park's resources or values if this alternative were implemented. This is concluded because no major adverse impacts would occur. Specifically, no major adverse impacts would occur to necessary resources needed to fulfill specific purposes identified in the establishing legislation or proclamation of the park, or resources that are key to the natural or cultural integrity of the park, or resources identified as a goal in the park's general management plan or other relevant NPS planning documents.

Conclusion: There would be a long-term negligible indirect impact to wildlife from implementing no action, resulting from increased maintenance on the existing distribution lines. Cumulatively, impacts to wildlife would also be negligible over the long term.

Alternative B – Preferred Alternative

Direct/Indirect Impacts: The proposed development may have a minor adverse effect on individual animals or on localized natural processes; however, population level effects are not anticipated for any species. The habitat in and around Grand Canyon Village would continue to provide for wildlife species that are habituated or highly adaptable to the human environment, such as deer, birds, squirrels, and rodents. Distribution and abundance of these wildlife species in and around the project area would not substantially change once construction was complete. The 5.45 acres of habitat needed to bury the distribution line would once again be available for use by wildlife once the distribution line was built and revegetated. However, the 1.2 acres used for the substation would be fenced and no longer available for wildlife use.

Removal of the existing substation and feeder line would not be expected to affect wildlife, as they are located in a highly developed area of Grand Canyon Village that is of limited habitat value to wildlife.

Routine maintenance and operation of the substation and distribution line would have a negligible impact on wildlife.

Cumulative Impacts: Cumulatively, impacts to wildlife would be minor primarily from continued loss of this and other adjacent forested habitats because of continued urban development and slow expansion of Grand Canyon Village. The remaining ponderosa-piñon-gambel oak-juniper habitat, as well as other forested habitats, in the Grand Canyon Village area would continue to provide for wildlife that are habituated to or have a high tolerance to human activity. Future projects (e.g. the mass transit system) may increase the potential for wildlife to be killed by mass transit vehicles (trains or buses), but would reduce the potential for wildlife to be killed from private vehicles, as most visitors would park their private vehicles in Tusayan and use the mass transit system in the park. Collectively, all the projects in this area have been designed to use areas that have already been disturbed to the extent practicable in order to minimize impacts to wildlife habitat and the environment.

Impairment: There would be no impairment of the Grand Canyon National Park's resources or values if this alternative were implemented. This is concluded because no major adverse impacts would occur.

Specifically, no major adverse impacts would occur to necessary resources needed to fulfill specific purposes identified in the establishing legislation or proclamation of the park, or resources that are key to the natural or cultural integrity of the park, or resources identified as a goal in the park's general management plan or other relevant NPS planning documents.

Conclusion: Short-term impacts to wildlife would be minor. Long-term habitat loss would involve 1.2 acres and would be considered a minor impact. Cumulatively, impacts to wildlife would be minor primarily from continued loss of habitat.

Alternative C

Direct/Indirect Impacts: Impacts to wildlife would be similar to those described under Alternative B, except that this alternative would have a greater potential for impacts to wildlife from electrocution. This alternative would add approximately 1½ miles of overhead power lines to the Park's electrical infrastructure. Bird species may have the greatest potential for impacts because they are more likely to collide or be electrocuted by an overhead line. Electrocution is typically of greatest concern for raptors because of their large wingspans. To reduce the potential for both electrocutions and collisions, the line would be constructed using guidelines described in *Suggested Practices for Raptor Protection on Power Lines: State of the Art in 1981* (Olendorff et al. 1981).

The existing overhead line does not have a history of bird electrocutions or collisions. Since the line would be placed in the same corridor, the potential for collisions is not expected to greatly increase.

Cumulative Impacts: Cumulatively, impacts to wildlife would be minor primarily from continued loss of this and other adjacent forested habitats because of continued urban development and slow expansion of Grand Canyon Village. The remaining ponderosa-piñon-gambel oak-juniper habitat, as well as other forested habitats, in the Grand Canyon Village area would continue to provide for wildlife that are habituated to or have a high tolerance to human activity. Future projects (e.g. the mass transit system) may increase the potential for wildlife to be killed by mass transit vehicles (trains or buses), but would reduce the potential for wildlife to be killed from private vehicles, as most visitors would park their private vehicles in Tusayan and use the mass transit system in the park. Collectively, all the projects in this area have been designed to use areas that have already been disturbed to the extent practicable in order to minimize impacts to wildlife habitat and the environment.

Impairment: There would be no impairment of the Grand Canyon National Park's resources or values if this alternative were implemented. This is concluded because no major adverse impacts would occur. Specifically, no major adverse impacts would occur to necessary resources needed to fulfill specific purposes identified in the establishing legislation or proclamation of the park, or resources that are key to the natural or cultural integrity of the park, or resources identified as a goal in the park's general management plan or other relevant NPS planning documents.

Conclusion: Short-term impacts to wildlife would be minor. The use of mitigation measures would reduce possible impacts to wildlife; therefore, long-term impacts to wildlife would be minor to populations but may be moderate to individuals. Cumulative impacts would be minor.

Threatened and Endangered /Special Status Species

Methodology

Information on possible threatened, endangered, candidate species and species of special concern was gathered from prior research at Grand Canyon National Park. Map locations of habitat associated with these species were compared with locations of the proposed substation and distribution line, as well as the existing substation that would be removed. Known impacts caused by construction activities were also considered.

In-depth discussion of federally listed species for various projects on the South Rim is the subject of a separate Biological Assessment (BA) prepared by the NPS. The BA presents a detailed analysis of the potential impacts to federally listed species from several projects proposed on the South Rim, including the proposed substation relocation. U.S. Fish and Wildlife Service concurred with the park's determination that implementation of this project, along with many other construction projects in the park over the next five years, may affect, but is not likely to adversely affect, the Mexican spotted owl, California condor, Sentry milk vetch, bald eagle, or their habitat (USFWS 2002). As required mitigation of the BA, the U.S. Fish and Wildlife Service would be consulted prior to a decision being made on this proposal (NPS 2002). The thresholds of change for the intensity of an impact are defined as follows:

Negligible: An action that could result in a change to a population or individuals of a species or designated critical habitat, but the change would be so small that it would not be of any measurable or perceptible consequence. The change would result in a *no effect* opinion from the U.S. Fish and Wildlife Service.

Minor: An action that could result in a change to a population or individuals of a species or designated critical habitat. The change would be measurable but small and localized and of little consequence, and result in a *may effect* opinion from the U.S. Fish and Wildlife Service.

Moderate: An action that would result in some change to a population or individuals of a species or designated critical habitat. The change would be measurable and of consequence but result in a *not likely to adversely effect* opinion from the U.S. Fish and Wildlife Service.

Major: An action that would result in a noticeable change to a population or individuals of a species or resource or designated critical habitat. The change would result in a *likely to adversely effect* opinion from the U.S. Fish and Wildlife Service.

Mexican Spotted Owl

Alternative A – No Action

Direct/Indirect Impacts: No construction activities are proposed under this alternative. Therefore, there would be no impact to the owl or to owl territories from this alternative.

Cumulative Impacts: There would be no cumulative impacts to Mexican spotted owls as a result of implementing this alternative.

Impairment: There would be no impairment of the Grand Canyon National Park's resources or values if this alternative were implemented. This is concluded because no major adverse impacts would occur. Specifically, no major adverse impacts would occur to necessary resources needed to fulfill specific purposes identified in the establishing legislation or proclamation of the park, or resources that are key to the natural or cultural integrity of the park, or resources identified as a goal in the park's general management plan or other relevant NPS planning documents.

Conclusion: There is no impact to the owl or to owl territories from this alternative.

Alternative B – Preferred Alternative

Direct/Indirect Impacts: The closest known Mexican spotted owls are over 0.5 miles from the proposed substation and distribution line. Impacts to nesting/roosting and foraging habitat for the Mexican spotted owl is not expected because of the limited scope of the project and its distance from this type of habitat.

Noise from construction activities associated with building the new substation and distribution line and removing the existing substation and feeder line may affect Mexican spotted owls. Equipment that would most likely be used during construction includes dozers and excavators, which have noise levels of about

85 dBA (A-weighted decibals) at 50 feet. These noise levels would dissipate to between 49 and 55 dBA at a distance of 0.5 miles, which is equivalent to noise levels typically found in libraries. Any Mexican spotted owls occupying predicted habitat farther than 0.5 miles from the project area would not be affected by this level of sound because they would be habituated to such routine noise levels from visitor use of the park (NPS 2002).

Typical blasting creates noise levels of about 94 dBA at 50 feet, which would dissipate to between 58 and 64 dBA at a distance of 0.5 miles, assuming there are no obstructions to reflect sound. Trees and uneven terrain between the project site and the nest/roost site would reflect some of the sound waves. Sound levels between 58 and 64 dBA are equivalent to normal conversational speech, and such sound levels are not likely adversely affect Mexican spotted owls (*Ibid.*).

Blasting within one mile of occupied owl habitat has the potential to affect spotted owls (USFWS 2001). It is not certain whether blasting will be necessary for this project. The park would prefer that blasting not be done and will explore other methods before conducting blasting. However, to minimize the potential for impact to owls, all construction activities for the site would be limited to the non-breeding season for owls. This will minimize the potential for disturbance to the Pipe Spring owls, which are located more than 0.5 miles from the project area.

Cumulative Impacts: The proposed substation and distribution line and other foreseeable projects may affect spotted owl habitat, primarily foraging habitat. These projects could also increase disturbance to the owls during construction. Mitigation measures would be implemented for any present and future projects that would limit disturbance during the spotted owl breeding season. Therefore, the cumulative impacts would be negligible.

Impairment: There would be no impairment of the Grand Canyon National Park's resources or values if this alternative were implemented. This is concluded because no major adverse impacts would occur. Specifically, no major adverse impacts would occur to necessary resources needed to fulfill specific purposes identified in the establishing legislation or proclamation of the park, or resources that are key to the natural or cultural integrity of the park, or resources identified as a goal in the park's general management plan or other relevant NPS planning documents.

Conclusion: The proposed project would have a minor effect on the Mexican spotted owl or its habitat.

Alternative C

Direct/Indirect Impacts: Impacts to the Mexican spotted owl would be the same as those described under Alternative B, except that this alternative would have a greater potential for birds to collide or become electrocuted by the overhead lines.

Cumulative Impacts: Cumulative impacts to the Mexican spotted owl would be the same as those described under Alternative B.

Impairment: There would be no impairment of the Grand Canyon National Park's resources or values if this alternative were implemented. This is concluded because no major adverse impacts would occur. Specifically, no major adverse impacts would occur to necessary resources needed to fulfill specific purposes identified in the establishing legislation or proclamation of the park, or resources that are key to the natural or cultural integrity of the park, or resources identified as a goal in the park's general management plan or other relevant NPS planning documents.

Conclusion: The proposed project would have a minor effect on the Mexican spotted owl or its habitat.

California Condor

Alternative A – No Action

Direct/Indirect Impacts: No construction activities are proposed under this alternative. Therefore, there would be no impact to the condor or its foraging habitat from this alternative.

Cumulative Impacts: There would be no cumulative impacts to California condors as a result of implementing this alternative.

Impairment: There would be no impairment of the Grand Canyon National Park's resources or values if this alternative were implemented. This is concluded because no major adverse impacts would occur. Specifically, no major adverse impacts would occur to necessary resources needed to fulfill specific purposes identified in the establishing legislation or proclamation of the park, or resources that are key to the natural or cultural integrity of the park, or resources identified as a goal in the park's general management plan or other relevant NPS planning documents.

Conclusion: There would be no impact to the condor or its foraging habitat from this alternative.

Alternative B – Preferred Alternative

Direct/Indirect Impacts: Implementation of the preferred alternative may affect California condors perching, roosting and foraging habitat because the project is located in habitat that is known to be occupied by condors from March through October. This would be considered a minor adverse impact. The main concern with California condors in relation to the proposed action is contact with humans. Condors are naturally curious and it is not uncommon for them to be seen frequenting areas of high human activity, such as Grand Canyon Village on the South Rim. The noise and activity associated with construction can often attract condors to the site and can increase the potential for interaction between condors and humans. Condor contact with humans would be of concern if visitors or construction workers harass the birds or if the birds become habituated to humans. Mitigation measures to educate construction workers of condor concerns and to cease activities if condors are present would reduce potential disturbance from construction activities on the birds. Hazing by permitted park employees or Peregrine Fund personnel would ensure condors do not become habituated to humans.

Blasting within one mile of roosting, perching or foraging condors has the potential to affect California condors. The impacts of blasting are discussed under the analysis for the Mexican spotted owl. Currently, there are many known roosts, perches and foraging areas for condors within one mile of the proposed substation and distribution line. Mitigation measures would be implemented that should minimize the likelihood of adverse impacts from project implementation on condors.

Cumulative Impacts: NPS staff have developed mitigation measures to protect condors that utilize habitat in the park from visitors and construction activities. Therefore, cumulative impacts from past, present, and foreseeable actions would be negligible.

Impairment: There would be no impairment of the Grand Canyon National Park's resources or values if this alternative were implemented. This is concluded because no major adverse impacts would occur. Specifically, no major adverse impacts would occur to necessary resources needed to fulfill specific purposes identified in the establishing legislation or proclamation of the park, or resources that are key to the natural or cultural integrity of the park, or resources identified as a goal in the park's general management plan or other relevant NPS planning documents.

Conclusion: The proposed project would have a minor effect on the California condor.

Alternative C

Direct/Indirect Impacts: Impacts to the California condor would be the same as those described under Alternative B, except that this alternative would have a greater potential for birds to collide or become electrocuted by the overhead lines.

Cumulative Impacts: Cumulative impacts to the California condor would be the same as those described under Alternative B.

Impairment: There would be no impairment of the Grand Canyon National Park's resources or values if this alternative were implemented. This is concluded because no major adverse impacts would occur. Specifically, no major adverse impacts would occur to necessary resources needed to fulfill specific purposes identified in the establishing legislation or proclamation of the park, or resources that are key to the natural or cultural integrity of the park, or resources identified as a goal in the park's general management plan or other relevant NPS planning documents.

Conclusion: The proposed project would have a minor effect on the California condor.

Sentry Milk Vetch

Alternative A – No Action

Direct/Indirect Impacts: No construction activities are proposed under this alternative. Therefore, there is no impact to the Sentry milk vetch from this alternative.

Cumulative Impacts: There would be no cumulative impacts to the Sentry milk vetch as a result of implementing this alternative.

Impairment: There would be no impairment of the park's resources or values if this alternative were implemented. This is concluded because no major adverse impacts would occur. Specifically, no major adverse impacts would occur to necessary resources needed to fulfill specific purposes identified in the establishing legislation or proclamation of the park, or resources that are key to the natural or cultural integrity of the park, or resources identified as a goal in the park's general management plan or other relevant NPS planning documents.

Conclusion: There would be no impact to the Sentry milk vetch from this alternative.

Alternative B – Preferred Alternative

Direct/Indirect Impacts: The closest known population of Sentry milk vetch is several miles from the project area. No plants were discovered during biological surveys of the project area. Therefore, there would be no effect on the Sentry milk vetch from implementing this alternative.

Cumulative Impacts: There would be no cumulative impacts to the Sentry milk vetch as a result of implementing this alternative.

Impairment: There would be no impairment of the Grand Canyon National Park's resources or values if this alternative were implemented. This is concluded because no major adverse impacts would occur. Specifically, no major adverse impacts would occur to necessary resources needed to fulfill specific purposes identified in the establishing legislation or proclamation of the park, or resources that are key to the natural or cultural integrity of the park, or resources identified as a goal in the park's general management plan or other relevant NPS planning documents.

Conclusion: The proposed project would have a negligible impact on the Sentry milk vetch.

Alternative C

Direct/Indirect Impacts: Impacts to the Sentry milk vetch would be the same as those described under Alternative B.

Cumulative Impacts: Cumulative impacts to the Sentry milk vetch would be the same as those described under Alternative B.

Impairment: There would be no impairment of the Grand Canyon National Park's resources or values if this alternative were implemented. This is concluded because no major adverse impacts would occur. Specifically, no major adverse impacts would occur to necessary resources needed to fulfill specific purposes identified in the establishing legislation or proclamation of the park, or resources that are key to the natural or cultural integrity of the park, or resources identified as a goal in the park's general management plan or other relevant NPS planning documents.

Conclusion: The proposed project would have a negligible impact on the Sentry milk vetch.

Northern Goshawk

Alternative A – No Action

Direct/Indirect Impacts: No construction activities are proposed under this alternative. Therefore, there would be no impact to the goshawk or its foraging habitat from this alternative.

Cumulative Impacts: There would be no cumulative impacts to northern goshawks as a result of implementing this alternative.

Impairment: There would be no impairment of the park's resources or values if this alternative were implemented. This is concluded because no major adverse impacts would occur. Specifically, no major adverse impacts would occur to necessary resources needed to fulfill specific purposes identified in the establishing legislation or proclamation of the park, or resources that are key to the natural or cultural integrity of the park, or resources identified as a goal in the park's general management plan or other relevant NPS planning documents.

Conclusion: There would be no impact to the goshawk or its habitat from this alternative.

Alternative B – Preferred Alternative

Direct/Indirect Impacts. Impacts to nesting/roosting and foraging habitat for the northern goshawk are expected to be negligible because of the limited scope of the project, the fact that the proposal would occur in an already developed and disturbed area, and its distance from this type of habitat. The closest known Northern goshawk is approximately $\frac{3}{4}$ miles southeast of the proposed site for the substation. It is possible that goshawks could fly over the project area; however, the project area does not contain preferred habitat for this species. Prior to implementing this alternative, surveys would be completed according to protocol to determine the presence or absence of Northern goshawks within the project area.

Cumulative Impacts. Foreseeable future projects as well as the proposed substation and distribution line would occur in already disturbed areas to the extent possible and would not affect the prey base for foraging Northern goshawks. None of the foreseeable actions would affect nesting habitat. Therefore, cumulative impacts to Northern goshawks are expected to be negligible.

Impairment: There would be no impairment of the Grand Canyon National Park's resources or values if this alternative were implemented. This is concluded because no major adverse impacts would occur. Specifically, no major adverse impacts would occur to necessary resources needed to fulfill specific purposes identified in the establishing legislation or proclamation of the park, or resources that are key to

the natural or cultural integrity of the park, or resources identified as a goal in the park's general management plan or other relevant NPS planning documents.

Conclusion: The proposed project is expected to have a negligible impact on the Northern goshawk. However, prior to project implementation, a survey of the project area would be completed according to protocol to determine the presence or absence of the species within the project area.

Alternative C

Direct/Indirect Impacts: Impacts to the Northern goshawk would be the same as those described under Alternative B, except that this alternative would have a greater potential for birds to collide or become electrocuted by the overhead lines.

Cumulative Impacts: Cumulative impacts to the Northern goshawk would be the same as those described under Alternative B.

Impairment: There would be no impairment of the Grand Canyon National Park's resources or values if this alternative were implemented. This is concluded because no major adverse impacts would occur. Specifically, no major adverse impacts would occur to necessary resources needed to fulfill specific purposes identified in the establishing legislation or proclamation of the park, or resources that are key to the natural or cultural integrity of the park, or resources identified as a goal in the park's general management plan or other relevant NPS planning documents.

Conclusion: The proposed project is expected to have a negligible impact on the Northern goshawk. However, prior to project implementation, a survey of the project area would be completed according to protocol to determine the presence or absence of the species within the project area.

Peregrine Falcon

Alternative A – No Action

Direct/Indirect Impacts: No construction activities are proposed under this alternative. Therefore, there would be no impact to the peregrine falcon or its foraging habitat from this alternative.

Cumulative Impacts: There would be no cumulative impacts to peregrine falcons as a result of implementing this alternative.

Impairment: There would be no impairment of the Grand Canyon National Park's resources or values if this alternative were implemented. This is concluded because no major adverse impacts would occur. Specifically, no major adverse impacts would occur to necessary resources needed to fulfill specific purposes identified in the establishing legislation or proclamation of the park, or resources that are key to the natural or cultural integrity of the park, or resources identified as a goal in the park's general management plan or other relevant NPS planning documents.

Conclusion: There would be no impact to the peregrine falcon or its foraging habitat from this alternative.

Alternative B – Preferred Alternative

Direct/Indirect Impacts: Impacts to nesting/roosting and foraging habitat for the peregrine falcon are expected to be negligible because of the limited scope of the project and its distance from this type of habitat. The closest active peregrine falcon territory is approximately one mile to the northwest of the proposed substation. Although peregrine falcons have been observed flying over forested areas of the park, main foraging areas that have been documented are limited to the rim, about one-half mile into the forest area from the rim, and river areas at the bottom of the canyon where prey is abundant. It is possible

that peregrine falcons could fly over the project area; however, the project area does not fall within any of the defined foraging areas.

As discussed for the Mexican spotted owl, noise or blasting from construction activities may affect peregrine falcons, but these noises are expected to dissipate to levels that would not likely adversely affect the falcons within 0.5 miles from construction activities.

Cumulative Impacts: Foreseeable future projects as well as the proposed substation and distribution line would occur in already disturbed areas to the extent possible and would not affect the prey base for foraging peregrine falcons. None of the foreseeable actions would affect nesting habitat. Therefore, cumulative impacts to peregrine falcons would be negligible.

Impairment: There would be no impairment of the Grand Canyon National Park's resources or values if this alternative were implemented. This is concluded because no major adverse impacts would occur. Specifically, no major adverse impacts would occur to necessary resources needed to fulfill specific purposes identified in the establishing legislation or proclamation of the park, or resources that are key to the natural or cultural integrity of the park, or resources identified as a goal in the park's general management plan or other relevant NPS planning documents.

Conclusion: The proposed project would have a negligible impact on the peregrine falcon.

Alternative C

Direct/Indirect Impacts: Impacts to the peregrine falcon would be the same as those described under Alternative B, except that this alternative would have a greater potential for birds to collide or become electrocuted by the overhead lines.

Cumulative Impacts: Cumulative impacts to the peregrine falcon would be the same as those described under Alternative B.

Impairment: There would be no impairment of the Grand Canyon National Park's resources or values if this alternative were implemented. This is concluded because no major adverse impacts would occur. Specifically, no major adverse impacts would occur to necessary resources needed to fulfill specific purposes identified in the establishing legislation or proclamation of the park, or resources that are key to the natural or cultural integrity of the park, or resources identified as a goal in the park's general management plan or other relevant NPS planning documents.

Conclusion: The proposed project would have a negligible impact on the peregrine falcon.

Cultural Resources

Historic

Methodology

For a structure or building to be listed in the National Register of Historic Places, it must be associated with an important historic context, meaning that it possesses significance – the value or meaning ascribed to the structure or building, *and* have integrity of those features necessary to convey its significance, for example, location, design, setting, workmanship, materials, feeling, and association (see National Register Bulletin #15, *How to Apply the National Register Criteria for Evaluation [NPS 1995b]*). For purposes of

analyzing potential impacts to historic structures/buildings, the thresholds of change for the intensity of an impact are defined as follows:

Negligible: Impact(s) is at the lowest levels of detection - barely perceptible and not measurable. For purposes of Section 106, the determination of effect would be *no adverse effect*.

Minor: Adverse impact – Impact would not affect the character defining features of a National Register of Historic Places eligible or listed structure or building.

Beneficial impact – Stabilization/preservation of character defining features in accordance with the *Secretary of the Interior's Standards for the Treatment of Historic Properties*, to maintain existing integrity of a structure or building. For purposes of Section 106, the determination of effect would be *no adverse effect*.

Moderate: Adverse impact – Impact would alter a character defining feature(s) of the structure or building but would not diminish the integrity of the resource to the extent that its National Register eligibility is jeopardized.

Beneficial impact – Rehabilitation of a structure or building in accordance with the *Secretary of the Interior's Standards for the Treatment of Historic Properties*, to make possible a compatible use of the property while preserving its character defining features. For purposes of Section 106, the determination of effect would be *no adverse effect*.

Major: Adverse impact – Impact would alter a character defining feature(s) of the structure or building, diminishing the integrity of the resource to the extent that it is no longer eligible to be listed in the National Register. For purposes of Section 106, the determination of effect would be *adverse effect*.

Beneficial impact – Restoration in accordance with the *Secretary of the Interior's Standards for the Treatment of Historic Properties*, to accurately depict the form, features, and character of a structure or building as it appeared during its period of significance. For purposes of Section 106, the determination of effect would be *no adverse effect*.

Alternative A – No Action

Direct/Indirect Impacts: No ground disturbing activities would be conducted under this alternative; therefore, there would be no direct impact to historic sites. This alternative would preclude any benefit of improving the integrity of the historic district from removing the existing substation from the historic district's boundaries.

Cumulative Impacts: Alternative A would not contribute to cumulative impacts on identified historic properties. Some historic structures at the South Rim and throughout the Grand Canyon have been adversely impacted from past construction disturbance, perhaps occurring before establishment of the park and/or as a result of inadvertent impacts prior to the legal requirements for archeological survey, site protection, and mitigation. Visitor use pressures have also contributed to past impacts. Combined with increasing visitor use in the area, other current and foreseeable construction projects (e.g. proposed mass transit system, proposed Heritage Education Campus, greenway, and other facilities) also have the potential to impact historic properties as a result of ground disturbance. If adverse impacts could not be avoided, the NPS would implement data recovery excavations or other mitigation measures.

Impairment: There would be no impairment of the Grand Canyon National Park's resources or values if this alternative were implemented. This is concluded because no major adverse impacts would occur. Specifically, no major adverse impacts would occur to necessary resources needed to fulfill specific

purposes identified in the establishing legislation or proclamation of the park, or resources that are key to the natural or cultural integrity of the park, or resources identified as a goal in the park's general management plan or other relevant NPS planning documents.

Conclusion: There would be no impact to historic properties from this alternative. Additionally, no benefit to the integrity of the historic district would be realized.

Alternative B – Preferred Alternative

Direct/Indirect Impacts: The proposed site for the new substation and distribution line are outside the boundaries of the Grand Canyon Village National Historic Landmark District and within an already disturbed utility/transportation corridor. Construction of the substation and distribution line would not impact any known historic structures or the integrity of the historic district. However, removal of the existing substation (which is a noncontributor to the historic district designation) from within the boundaries of the historic district would temporarily disturb the area. Park staff believes that removing these features—which were added in the mid 1950s, after what is considered the historic district's period of significance—would improve the architectural character of the district and its overall landscape. Several buildings that are contributors to the NHL designation are within close proximity to the existing substation, including the Horse Barn or Livery Stables (NR #563), Powerhouse (NR # 567), Purchasing and Receiving Building, formerly Laundry (NR #569), Maintenance Shop, formerly Paint Shop (NR #572), and Fred Harvey Mule Barn (NR #562). Dismantling the existing substation is not expected to affect the integrity of any of these structures. Enough space is available within and around the existing substation to be able to remove the substation without damaging other structures that surround the substation. In addition, the substation is fenced and all dismantling activities would be confined to this area, further limiting the potential to affect surrounding historic structures that contribute to the NHL designation.

Although the removal of the substation could affect the ability of the NPS to convey the sense of function of the Powerhouse, this effect would be mitigated by designing interpretive displays for the Powerhouse that explain its original function, as well as the function of the entire site as an industrial/utility area for the park.

Cumulative Impacts: This alternative would not add to cumulative impacts on the Grand Canyon Village National Historic Landmark District because the construction of the new facility occurs outside its boundaries and within an already disturbed utility corridor. Removing the existing substation and distribution lines that feed the substation would improve the visual quality of the district. The historic integrity of some buildings and structures within the district is threatened by years of neglect. Likewise, the construction of modern, non-contributing buildings have compromised the district's architectural integrity to a minor degree. Other foreseeable projects (e.g. restoration of the ranger operations building, proposed Heritage Education Campus, new mule barn, transit system, etc.) also have the potential to impact historic buildings scheduled for adaptive use, or to alter the district's cultural landscape as a result of new construction. The NPS would avoid or mitigate potential adverse impacts by ensuring that new construction adheres to appropriate design guidelines, and that preservation maintenance and/or more comprehensive rehabilitation is carried out in conformance with the Secretary of the Interior's Standards for the Treatment of Historic Properties (NPS 1995c).

Impairment: There would be no impairment of the Grand Canyon National Park's resources or values if this alternative were implemented. This is concluded because no major adverse impacts would occur. Specifically, no major adverse impacts would occur to necessary resources needed to fulfill specific purposes identified in the establishing legislation or proclamation of the park, or resources that are key to the natural or cultural integrity of the park, or resources identified as a goal in the park's general management plan or other relevant NPS planning documents.

Section 106 Summary: There would be no impacts to known historic properties. Removal of the existing substation and feeder lines would remove a non-historic, non-contributing element from the Grand Canyon Village National Historic Landmark District. After applying the Advisory Council on Historic Preservation's criteria of adverse effects (36 CFR §800.5, *Assessments of Adverse Effects*), implementation of the preferred alternative would have no adverse effect on any National Register eligible sites or properties.

Conclusion: Construction of the substation and distribution line would not affect any known historic properties. The potential exists to improve the visual integrity of the Grand Canyon Village National Historic Landmark District from removing the existing substation is within the boundaries of the historic district. Therefore, a minor beneficial impact would occur.

Alternative C

Direct/Indirect Impacts: Impacts to historic properties would be the same as those described under Alternative B.

Cumulative Impacts: Cumulative impacts to historic properties would be the same as those described under Alternative B.

Impairment: There would be no impairment of the Grand Canyon National Park's resources or values if this alternative were implemented. This is concluded because no major adverse impacts would occur. Specifically, no major adverse impacts would occur to necessary resources needed to fulfill specific purposes identified in the establishing legislation or proclamation of the park, or resources that are key to the natural or cultural integrity of the park, or resources identified as a goal in the park's general management plan or other relevant NPS planning documents.

Conclusion: Construction of the substation and distribution line would not affect any known historic properties. The potential exists to improve the visual integrity of the Grand Canyon Village National Historic Landmark District from removing the existing substation is within the boundaries of the historic district. Therefore, a minor beneficial impact would occur.

Visitor Experience

Recreation Resources

Methodology

The alternatives were evaluated for potential impacts to recreational use of visitors. Intensity levels for potential impacts to recreation are defined as follows:

Negligible: An action that could result in impacts that are barely detectable and/or will affect few visitors.

Minor: An action that could result in impacts that are slight but detectable, and/or will affect some visitors.

Moderate: An action that could result in impacts that are readily apparent and/or will affect many visitors.

Major: An action that could result in impacts that are severely adverse or exceptionally beneficial and/or will affect the majority of visitors.

Alternative A – No Action

Direct/Indirect Impacts: Under this alternative, the existing substation and power line would remain in service. The proposed Heritage Education Campus would be designed around the substation. Although the substation is fenced, this alternative would increase safety concerns for visitors by directing them within close proximity to the substation. This would result in a moderate long-term impact to the visitor experience.

Cumulative Impacts: There would be no cumulative impacts to recreation as a result of implementing this alternative. However, the opportunity the Heritage Education Campus would provide to the visitor would be diminished or not realized.

Conclusion: This would result in a moderate long-term impact to the visitor experience, primarily from the increased safety of directing visitors within close proximity of the substation.

Alternative B – Preferred Alternative

Direct/Indirect Impacts: Construction of the proposed substation and distribution line would not affect recreational resources at the South Rim because the location of the substation is removed from areas typically used by the public. Some residents use the utility corridor for recreational purposes and would be affected while construction activities occur, but should be able to resume activities once construction and revegetation is complete. Limiting the construction zone to an area already disturbed minimizes the impact to these users.

Short-term, minor impacts would occur during construction of the distribution line as it crosses Center Road. Traffic control measures would be implemented during construction of the line beneath Center Road and would require temporary lane closures to permit equipment crossing, as well as traffic control measures (e.g. barriers, signs, etc.) to ensure safe travel around the construction zone.

Removal of the existing substation and feeder line would benefit the design of the proposed Heritage Education Campus without compromising the safety of visitors by directing them within close proximity to the substation. This would result in a moderate benefit to recreational resources on the South Rim.

Cumulative Impacts: The vast majority of projects on the South Rim, including past, present, and future proposals, have primarily been proposed in order to improve the visitor experience and recreational resources at the South Rim. The greenway trail, mass transit system, and Heritage Education Campus are designed to improve the visitor experience. Although construction may have a short-term impact on visitors because of temporary road or trail closures, long-term benefits would result from these projects.

Conclusion: Adverse impacts to recreation would be minor, primarily from construction related activities. However, this alternative would result in a long-term moderate beneficial effect on recreational resources in the park by removing the substation from an area intended for visitor use.

Alternative C

Direct/Indirect Impacts: Impacts to recreational resources would be the same as those described under Alternative B.

Cumulative Impacts: Cumulatively, impacts to recreational resources would be the same as those described under Alternative B.

Conclusion: Adverse impacts to recreation would be minor, primarily from construction related activities. However, this alternative would result in a long-term moderate beneficial effect on recreational resources in the park by removing the substation from an area intended for visitor use.

Visual Quality

Methodology

Visual quality affects both visitor enjoyment and perception of Grand Canyon National Park. All available information on visual resources was compiled. The potential impacts of the alternatives on visual resources of the project area was evaluated through on-site visits. The thresholds of change for the intensity of an impact are defined as follows:

Negligible: An action that could result in a change in visual quality that is barely detectable.

Minor: An action that could result in a change in visual quality that is slightly detectable and may be noticed by some visitors.

Moderate: An action that could result in a change in visual quality that is readily apparent and would be noticed by many visitors.

Major: An action that could result in an extreme change in visual quality that would be noticed by the majority of visitors.

Alternative A – No Action

Direct/Indirect Impacts: No construction activities would occur under this alternative; therefore, visual quality at the South Rim would not change if this alternative were selected. By not relocating the substation from the historic village district, the opportunity to improve visual quality of the visitor core of the village would not be realized.

Cumulative Impacts: There would be no cumulative impacts to visual quality as a result of implementing this alternative.

Conclusion: There would be no adverse or beneficial impacts to visual quality from implementing no action. The opportunity to improve the visual quality of Grand Canyon Village by relocating the substation from the visitor core would not occur.

Alternative B – Preferred Alternative

Direct/Indirect Impacts: The Grand Canyon is well known for its spectacular beauty, and people residing in or visiting the area expect the area to be visually spectacular. Grand Canyon Village, however, is the hub for visitor services and facilities and is highly developed. Within the area considered for this analysis are existing overhead transmission lines and underground water and sewer lines, as well as residential housing. The short-term visual effects of the proposed relocation of the substation would include disturbed land, construction equipment, and development activities.

The substation would be built in an area that is not visible by visitors. Its location, however, would be approximately ¼ mile from a residential area, but would not be visible from any residential units because of the ponderosa pine forest situated between them. Residents that use the existing right-of-way for recreational purposes would experience a diminished visual quality from construction of the substation.

Because of the previous disturbance within this corridor, this would be considered a long-term minor impact.

Since the distribution line would be placed within an established utility corridor, the visual character would not substantially change. The primary opportunity to notice the project would be from Center Road, as the line crosses Center Road on to Clinic Road. Because the line would be underground, this impact would be short-term and minor after construction and reclamation was complete and revegetation efforts successful.

The removal of the existing substation and feeder line would have a short-term minor impact, but would have a long-term benefit to the visual quality within historic district of Grand Canyon Village by removing a utility structure from an area intended to be used and viewed by visitors.

Cumulative Impacts: Grand Canyon Village is highly developed area on the South Rim of Grand Canyon. Within the village are residential housing, residential services and facilities (e.g. Grand Canyon School and Clinic), NPS administrative offices, utilities and infrastructure, and visitor services and facilities (e.g. lodging and restaurants). To maintain the visual integrity of the village and the vistas and viewpoints along the South Rim, new structures are required to harmonize with the area in proportion, color, and texture. New structures are located in areas that would not diminish the visual integrity of the Grand Canyon vistas or compromise the visitor experience. Many of the past, present, and future projects, including the substation and distribution line, have been proposed for areas that are already disturbed to minimize any additional impact to visual quality. Cumulative impacts to visual quality are expected to be minor.

Conclusion: Direct and indirect impacts to visual quality would be short-term and minor, primarily due to construction of the underground line. Cumulatively, impacts would also be minor.

Alternative C

Direct/Indirect Impacts: In addition to the short-term, construction related impacts to visual quality that are described under Alternative B, construction of an overhead distribution line would alter the physical setting and visual quality of the existing landscape. Impacts would be long-term and moderate. Power poles would be between 40 and 60 feet above ground, which would introduce straight, vertical lines and color contrasts under certain light conditions. Sunlight may also be reflected from the conductors; although, a “nonspecular” type of conductor would be installed to minimize the reflective glare.

As discussed under Alternative B, the removal of the existing substation and feeder line would have a short-term minor adverse impact, but would have a long-term benefit to visual quality within the visitor core of Grand Canyon Village.

Cumulative Impacts: Grand Canyon Village is a highly developed area on the South Rim of Grand Canyon. Within the village are residential housing, residential services and facilities (e.g. Grand Canyon School and Clinic), NPS administrative offices, utilities and infrastructure, and visitor services and facilities (e.g. lodging and restaurants). To maintain the visual integrity of the village and the vistas and viewpoints along the South Rim, new structures are required to harmonize with the area in proportion, color, and texture. New structures are located in areas that would not diminish the visual integrity of the Grand Canyon vistas or compromise the visitor experience. Many of the past, present, and future projects, including the substation and distribution line, have been proposed for areas that are already disturbed to minimize any additional impact to visual quality. Cumulative impacts to visual quality are expected to be minor.

Conclusion: Short-term impacts would be minor. Long-term impacts would be moderate, primarily from placement of the distribution line on overhead power poles.

Introduction

This chapter identifies the persons responsible for preparing this document, lists the individuals that were consulted or coordinated with for information regarding the document content, and provides a bibliographic citation for all referenced material. During the preparation of this EA/AEF, input was also received from federal, tribal, and county agencies; non-governmental organizations; and, private individuals. These entities are listed at the end of this chapter, followed by a brief synopsis of public scoping.

Preparers

AZtec Research & Consulting

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Consultation/Coordination

The following agencies, organizations and tribes were contacted for information or assisted in identifying important issues or analyzing impacts.

Agencies

Arizona Game and Fish Department

Phoenix Office

Arizona State Historic Preservation Office

James Garrison

National Park Service, Grand Canyon National Park

Joseph F. Alston, Superintendent

Brad Traver, Implementation Team Leader

Michael Terzich, Project Manager/Landscape Architect

Deborah Lutch, Compliance

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Carl Bowman, Air Quality Manager

RV Ward, Wildlife Program Manager

Elaine Leslie, Wildlife Biologist

Lori Makarick, Restoration Biologist

Jan Balsom, Cultural Resources Manager

Amy Horn, Archaeologist

Jon Rihs, Hydrologist

U.S. Fish and Wildlife Service

David L. Harlow

Tribes

Havasupai Tribe
Hopi Tribe
Hualapai Tribe
Kaibab Band of Paiute Indians
Navajo Nation
Paiute Indian Tribe of Utah
Pueblo of Zuni
San Juan Southern Paiute Tribe

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Scoping Responses

In August 2001, a public scoping letter about this project was sent to 353 individuals including federal and state agencies, special interest groups, American Indian tribes, and interested citizens. The letter described the proposed project and requested comments. In addition to the scoping letter, a news release was sent to local newspapers. Four letters were received from the following interested agencies, groups and citizens. There comments are summarized in Table 7.

Federal Agency

U.S. Fish and Wildlife Service

Tribal Agency

The Hopi Tribe

The Navajo Nation

Private Individuals (1)

Name Intentionally Withheld

Table 7. Comments Raised During Public Scoping

General Topic	Issues Raised
Park-related Opinions (outside scope of this EA/AEF)	<p>Park now has “theme park” atmosphere. What is the park trying to prove by redoing historic areas of the South Rim?</p> <p>Visitation should be limited.</p>
Socioeconomics	<p>Why go to the expense and uproar of moving the substation? What is wrong with where it is located and has been for many years?</p>
Comments	<p>Reserve comments until the EA (and any other project related documents) are made available to the public.</p> <p>Request was made to add names to the mailing list.</p>

APPENDIX A
Cultural Resources Specialists Review

I have reviewed this preferred alternative for conformity with requirement for the § 106 process, with the 1995 Servicewide Programmatic Agreement (if applicable), and applicable parts of the Secretary of the Interior's Stands and Guidelines for Archeology and Historic Preservation, MPS Management Policies, and DO-28. I have stated any additional stipulation that should apply, and I concur in the recommended assessment of effect above.

Signed: _____
Archaeologist _____ Date _____

Comments: _____

Signed: _____
Cultural Landscape Architect _____ Date _____

Comments: _____

Signed: _____
Curator _____ Date _____

Comments: _____

Signed: _____
Ethnographer _____ Date _____

Comments: _____

Signed: _____
Historian _____ Date _____

Comments: _____

Signed: _____
Historical Architect _____ Date _____

Comments: _____

Approved: _____
Park Compliance Coordinator _____ Date _____

Approved: _____
Superintendent _____ Date _____